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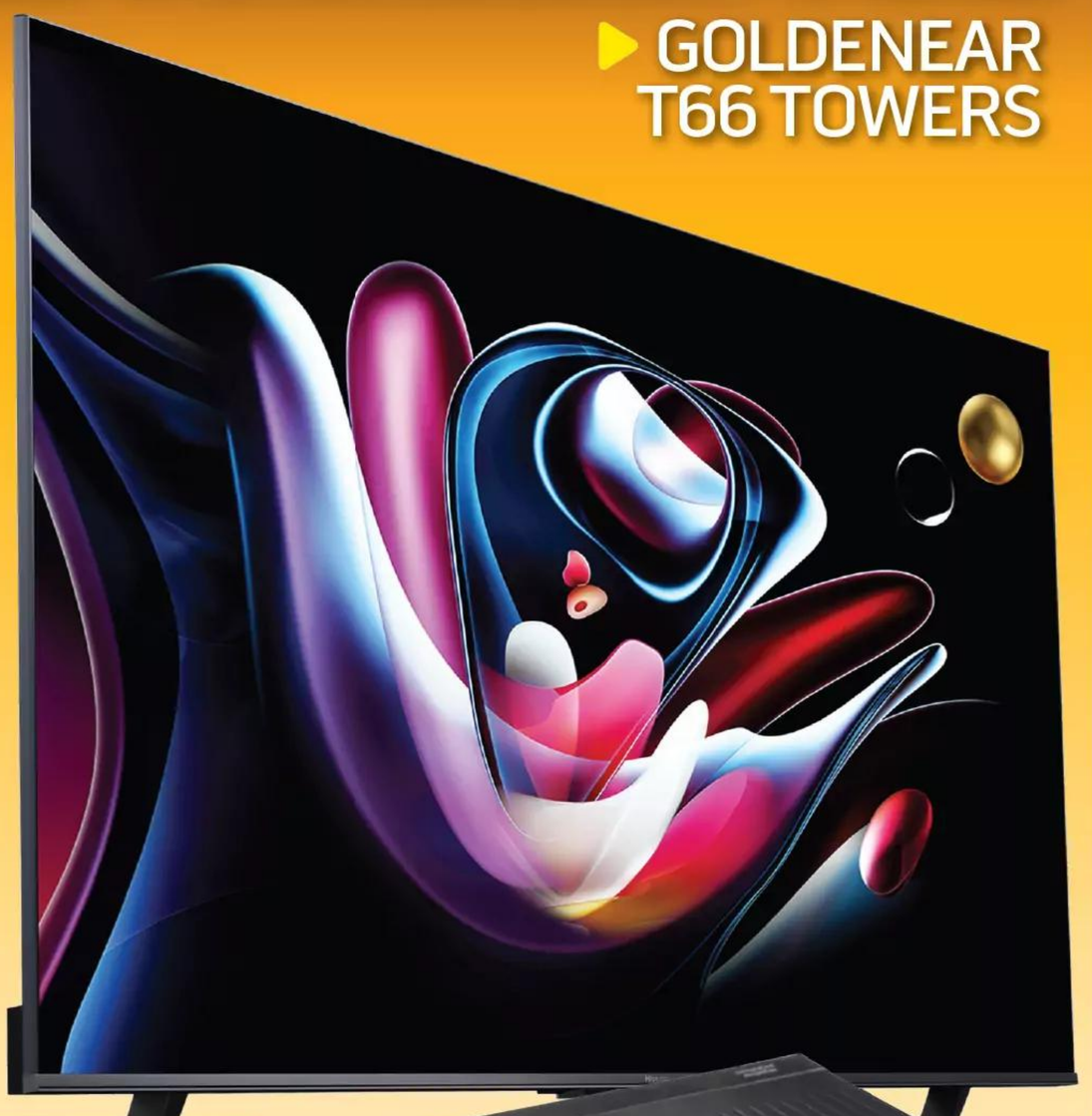

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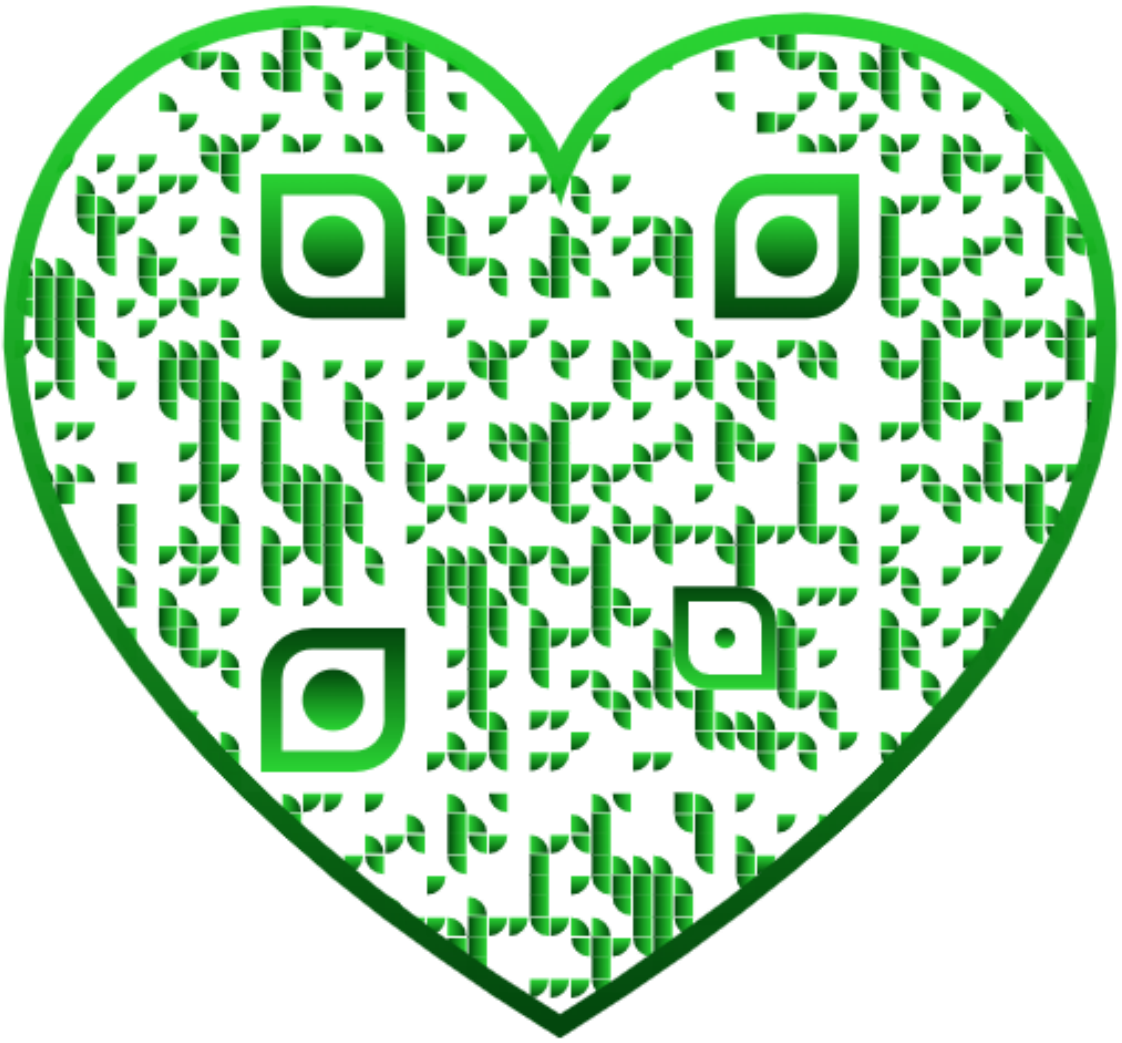

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contents features

54 THE BEATLES' LAST SONG & REBIRTH OF RED & BLUE

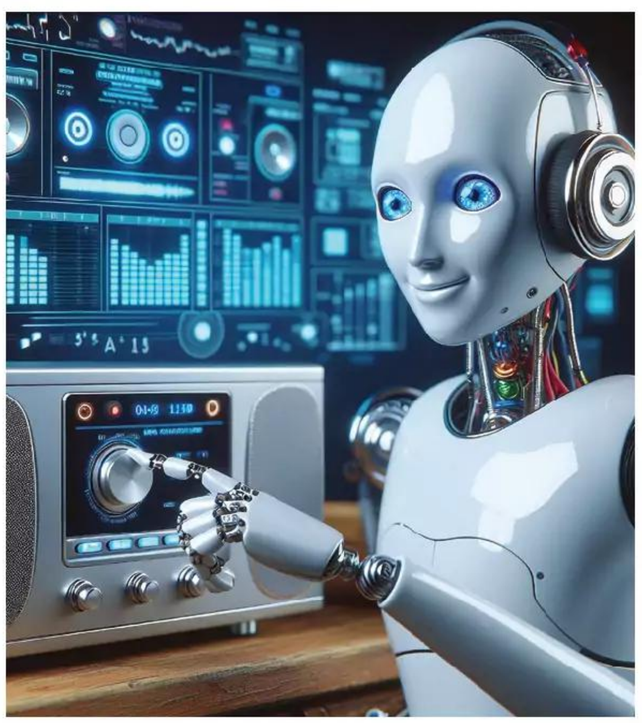
Unveiling The Beatles' Last Musical Gift: The creation, legacy, and technological revival of 'Now and Then' alongside the iconic *Red* and *Blue* albums. Dive into the final chapter of one of rock's most beloved bands as author Matt Hurwitz unravels the intricate process behind revitalizing a lost track and the creation of a song that bridges generations. It documents the meticulous efforts to present The Beatles' final harmony in a new light.

On the Cover Clockwise from top: Bluesound Pulse M portable speaker, GoldenEar T66 tower speaker, Arcam A25 and ST5 stereo system, Starke Sound SW15 subwoofer, Hisense C1 projector, Hisense U8K TV, OSD Nero AB5 active bookshelf speaker.

72

DELUXE EDITION

Mike Mettler reviews *The Yes Album* Super Deluxe Edition: A Comprehensive 4CD/1LP/1BD set elevating Yes' iconic sound with new mixes and rarities



contents test reports

20 **SAMSUNG Q990D 11.1.4 DOLBY ATMOS SOUNDBAR**

26 **GOLDENEAR T66 TOWER SPEAKERS**

30 **ARCAM A25 & ST5 STEREO SYSTEM**

34 **OSD NERO AB5 ACTIVE SPEAKERS**

38 **BLUESOUND PULSE M PORTABLE SPEAKER**

42 **HISENSE U8K 4K TV**

46 **STARKE SOUND SW15 SUBWOOFER**

50 **HISENSE C1 4K PROJECTOR**

columns

10 **Q&A**
Improving house audio system and tackling Atmos speaker challenges.

11 **THE GAWKER**
Seeing the world in spreadsheets: Michael Antonoff on display technology.

12 **WIDE ANGLE**
Quick Take: Portable home theater with an Elite screen and Anker Nebula projector.

14 **IMMERSIVE AUDIO FILE**
Genesis guitarist Steve Hackett's journey into surround sound and Atmos exploration.

16 **THE CONNECTED LIFE**
John Sciacca on CES 2024 and the latest trends in AV tech, from massive TVs to immersive audio.

17 **SIGNALS**
In Ken Pohlmann's latest column, AI transforms home theater interaction with humorous yet bumbling exchanges.

67 **ENTERTAINMENT**
Conan Chronicles, *The Hunger Games: The Ballad of Songbirds and Snakes*, *The Marvels*, *Wonka*, *Little Darlings*, *Oldboy*, *Trainspotting*, *Crisis on Infinite Earths Part 1*, *Footloose*.

74 **REMASTER CLASS**
Neil Young's *Harvest*: A timeless journey enhanced by Atmos.

departments

6 **TRACK ONE**
Vision Pro: A game-changer in mixed reality and entertainment experience

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Visions of the Future

Vision of the Future?

When Apple first announced the Vision Pro mixed reality headset, it set off a chain reaction of responses and predictions. There are those who've been waiting for VR and AR technology to mature, to manifest as a genuine leap forward, as the iPhone did upon its release—back when physical keyboard lovers scoffed at the notion of an all-screen phone.

There are, of course, many applications for Apple's new toy. However, its steep price point is notable for a first-generation, strictly personal device. Still, its extremely high-resolution OLED display holds promise for entertainment experiences like movie watching, which as an activity is comparatively passive and old-fashioned. Can a personal device visually surpass what's achievable with a traditional TV screen or projection system?

3D Returns

For fans of 3D, the answer is unequivocally "yes" because VR and mixed-reality headsets are already 3D-capable. VR games are 3D. It's the same old divide between those willing to wear something on their face to experience 3D and those not. And so it is not a huge surprise that IMAX recently announced it is bringing 3D movies to the Vision Pro.

Of course, you need sound to go with the vision. This is an area where the headset cannot compete with a dedicated theater. No matter how good the visuals are, the built-in sound can't compete with a dedicated home theater's sound system. It begs the question, would you watch a movie wearing a Vision Pro, but do so while listening to a full-size surround-sound system? Is that a bridge too far or would combining the very best visuals and sound be worth the effort?

3D skeptics need to keep in mind that video games are already effectively 3D in nature. I have the PlayStation VR2, which does not come remotely close to the Vision Pro's resolution but delivers a compelling 3D gaming experience nonetheless. It seems to me that kids always enjoy 3D, it's the adults who stop loving it.

Virtually Beyond 4K

Even without 3D in the mix, the prospects of per-eye resolution beyond 4K combined with OLED color and contrast is a potential dream come true for AV enthusiasts pursuing the perfect picture. Just like earbuds unlocked the world of full-range, audiophile-quality sound for the masses, personal displays derived from the technology found in the Vision Pro ought to democratize the high-end dedicated home theater viewing experience. Fingers crossed it actually does!

Coming to my Senses

I have not yet tried the Vision Pro and I admit that a reason I avoid it is, to quote Michael Antonoff, because I'd also "come very close to making the biggest impulse purchase of my life." What got me was his comment "I felt like I'd time traveled to the second half of the 21st Century." That's a feeling I'd pay $3,500 to experience at will.

Back to Reality

While the Vision Pro is a real, new product you can buy, the same chunk of change gets you some very cool tech that lets you enjoy music movies, and/or video games. In fact, the cost of entry for highly immersive experiences keeps dropping. Take as an example the Samsung Q990D Atmos soundbar. It's good enough that reviewers wind up comparing it favorably to an AVR with speakers and a sub. It leaves next to nothing on the table when it comes to a $2,000 surround sound system.

Speaking of sound, I take on the GoldenEar T66 tower speakers, which have built-in active subs and are an all-around upgrade in looks and performance over the Triton series. Now that Audioquest owns the brand, the T66 points to where it's going. And Jim Wilson puts a pair of Starke Sound SW15 subs through their paces. Leslie Shapiro gets into the hi-fi charms of an Arcam A25 and ST5 stereo system, meanwhile Barb Gonzalez checks out the Bluesound Pulse M wireless portable speaker.

Tom Norton tackles the Hisense U8K TV, when it comes to HDR, it managed to dazzle him like no other TV. And Michael Hamilton delves into the Hisense C1 mini projector, a cube-shaped wonder that delivers a solid cinematic image.

Every Now and Then...

Do not miss Matt Hurwitz's epic article on the making of The Beatles' last song, "Now and Then" and the re-release of *The Beatles 1962-1966* and *The Beatles 1967-1970* aka the *Red and Blue* compilation. It's the deep dive you've been looking for.

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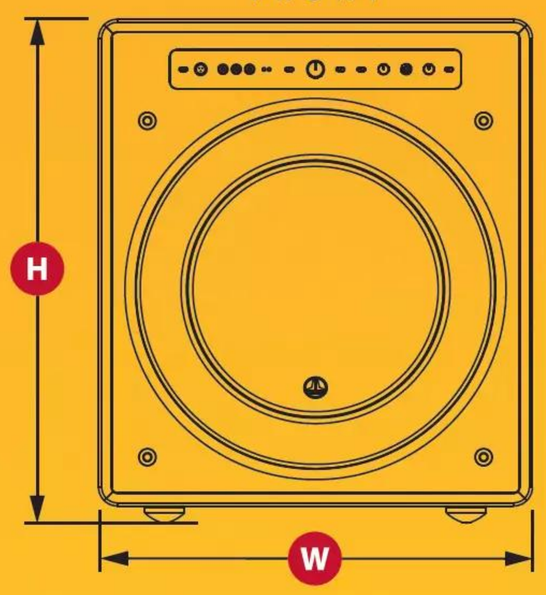

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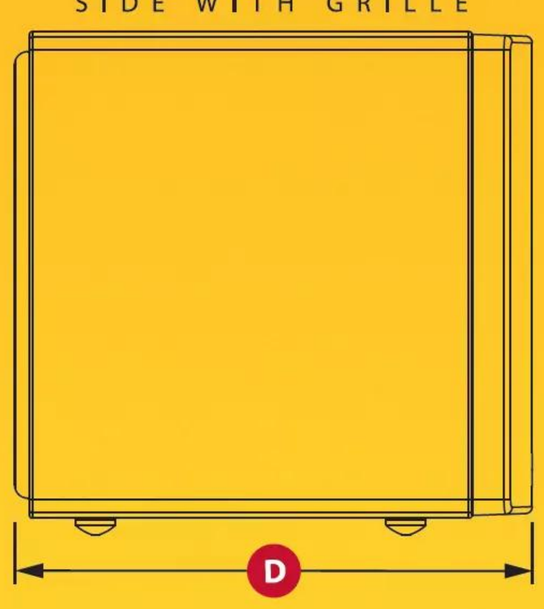

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SOUND &VISION

April May 2024 Volume 89/Number 3

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Product reviewers received free product for review purposes. Subwoofers pictured with grilles removed.

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wide angle Q&A

Optimizing Multiroom Bass

BY JOHN SCIACCA

Q **(Don Hamilton)** I have an existing housewide audio system with a receiver connected to a speaker selector and speakers and volume controls in four rooms. The bass isn't very good, and I'd like to improve it. How can I add a subwoofer to my housewide audio system?

A On the surface, this seems like it would be a simple answer: "Just plug a subwoofer into your receiver and set the volume! Done and done!" But that won't work correctly for various reasons (unless you never adjust the system's volume level or don't mind mismatched bass). In the system described above—a receiver powering a housewide audio system with volume controls in each room—you have two different volume controls: the receiver's volume, which sets the overall maximum level of the system (think of this as the gas), and the volume controls in each room which lowers the volume of that room (think of that as the brake).

Connecting a sub directly to the receiver adds a third volume control—that of the sub—and the sub would get its input signal level based on the volume level of the receiver, not the volume control in a room, so level matching would always be a challenge. However, there are a few ways to make this work correctly.

One: You could get a subwoofer with a high-level (speaker wire) input and wire it into the speaker wire output from a volume control in a room. Retrofitting a four-conductor wire inside the wall from a volume control location shouldn't be too tricky, but you'd need a local power outlet for the sub. Now the sub's level will rise/lower based on the volume control.

Two: You could add a new stereo receiver for any room where you wanted to add a subwoofer, and then use a wireless audio sender like the SVS SoundPath Wireless Adapter to send the sub signal to that room. You would want to remove the existing volume control and control that room's volume from the receiver.

Three: You could install a wireless audio system like a Sonos Amp or Sonos Sub for a convenient upgrade. Again, you'd want to remove the existing volume control and just use the Sonos app to adjust volume. Once the Amp and Sub are paired, this will work reliably and provide a significant boost in sound quality. As an alternative, consider upgrading the speakers in given rooms to larger models. Going to an 8- or even 10-inch speaker will produce significantly more bass and a richer sound overall.

Q **(Mark Miller)** I am installing my first home theater setup and I am using five ceiling speakers that were already pre-wired into the house when we bought it. It's a medium-sized family room. Should I buy a receiver with Dolby Atmos (Sony STR-DH790) or a better quality non-Atmos receiver (Denon AVR-S670)? I do not want to add any more speakers, so I'm wondering if the Dolby Atmos is worth it or would I not notice the Atmos effect using only the ceiling speakers?

A Before I get to your receiver question, I want to address the likely bigger issue: that you are using five in-ceiling speakers. While I frequently employ in-ceiling speakers for height and even surround channels, we seldom recommend them for the main LCR channels. The problem is that nearly all in-ceiling speakers direct sound straight down, not towards the listening position, which causes issues with imaging, clarity, and dialogue intelligibility, especially if the floor is a hard surface like wood or tile. The experience of all the sounds coming from the ceiling while sitting so far from the screen is disjointed.

There are in-ceiling speakers designed for LCR applications, with angled baffles that fire audio towards the listening position, like Focal's 300 ICLCR 5 or Episode's ES-HT700-ICLCR-5. Or you could get something like SpeakerCraft's AIM series that allows you to pivot the midrange and tweeters toward the listening position.

Careful receiver selection is essential; it is arguably the most important piece of electronics in your theater system, as it handles virtually everything. I always suggest buying up or at least getting something that's the most up-to-date. Between the two models you mentioned, the Sony is long in the tooth, having been released in 2018, whereas the Denon is far fresher; it was released last year.

Regarding Dolby Atmos versus Dolby Audio for your install, I reached out to Dolby Laboratories for an answer, and they said, "To unlock Dolby Atmos with [your] current speaker setup, [you] would need to add additional speakers. Regarding choosing an AVR, most high-end receivers today will come with Dolby Atmos anyway. In addition, while Dolby Audio will elevate dialogue, improve audio clarity, and deliver a Dolby surround sound experience, Dolby Atmos can do everything that Dolby Audio is capable of and more, including multidimensional immersive Dolby Atmos sound."

Another possibility worth considering is Sony's new AZ series – released last year – which all have a feature called "In-Ceiling Speaker Mode." The feature uses DSP to lower the perceived height of the soundstage to make it appear like audio from your ceiling speakers is coming from ear level.

wide angle

the gawker

Spreadsheets, Spreadsheets Everywhere

BY MICHAEL ANTONOFF

One takeaway from the recent Consumer Electronics Show is that we're going to need a longer measuring tape. Most top out at 96 inches or less, meaning they'll fall short when measuring the diagonal on a gigantic TV set.... But wait. Pythagoras to the rescue! Just measure the screen's horizontal (a) and vertical (b) dimensions, apply the formula ($a^2 + b^2 = c^2$) that we learned in geometry class, and calculate the longer number—the diagonal (c). No need to upgrade your measuring tape!

Except for addition, subtraction and multiplication, formulas are not really my thing. I've always had a hard time understanding the math in computer spreadsheets. Still, I can't stop thinking about them, especially as they relate to display devices. I watch TV and see Lotus 1-2-3. I look at a phone screen and see Excel. You know how the kid in the movie *The Sixth Sense* sees dead people? That's me, except I see spreadsheets. Weird, right?

Not really. There was a time when the rows and columns of an electronic spreadsheet ruled the computer revolution. VisiCalc and its offspring were the killer apps that sold millions of PCs, obsoleted paper ledgers, and doomed adding machines to the dumpster. They also launched scores of computer magazines, several of which I edited. I frequently used jargon like "productivity" and "mission critical." Not precisely home entertainment-worthy, but then I was talking to an audience of office workers and business managers.

Fast forward a couple of decades and we see the spreadsheet's matrix design deployed in every flat screen. Superficially, a 16-by-9 screen ratio can be expressed by highlighting cells A1 through P9. Making the picture is more involved, dependent on organizing thousands of columns and rows wired on a microscopic level. For instance, in plasma displays, now passé, the inert gasses through which electricity flowed and excited phosphors were individually contained in what was called a cell—sheet lingo for addressing the meeting of row and column.

As I watched the live stream from the 2024 CES on my computer, the axes of a spreadsheet seemed to be superimposed on the screen. When TCL's vice president of product marketing paced relentlessly on stage, I imagined him personifying the horizontal. Then, he announced that every new model of the company's soundbars will include Dolby Atmos. "We're taking sound to all new heights," he declared.

The most overt appropriation of spreadsheet technology can be seen in the electronic program guide (EPG) that viewers summon to see what's on TV at the point of need. Typically, the rows are channels, and the columns are time slots. Each cell contains a program title with an embedded, unseen formula for further action. When you highlight a cell and press select on your remote, you can call up a detailed program description or change the channel to where the program is currently playing. If you're using the EPG to look ahead, pressing select can set a reminder or launch record options. Manufacturers now pack more rows and columns on the screen than ever, thanks to larger displays and higher resolution. EPGs have come a long way, but fundamentally they're wordy spreadsheets.

While today's EPGs can sail through the week on X and Y axes alone, the buzz of 1986 in the spreadsheet world was the addition of the Z axis. It was a reason for consumers to upgrade their software. Z empowered the user to place one worksheet behind another. This innovation was called the "multi-dimensional spreadsheet." Suddenly, you could drill down. That meant creating a stack of worksheets, each fitting the boundaries of the screen instead of one enormous sheet that sprawled off the screen. Trying to find something on this humongous spreadsheet was a nightmare. But suppose you imagine the Z axis acting as a gutter collecting data from multiple levels. In that case, you can understand the significantly increased efficiency of navigating with the X, Y, *and* Z axes.

This kind of spreadsheet design is still very much with us. Every time we spread our fingers on our phones to enlarge an image to see the florets of a flower in a photo or decipher a street name on a map, we're drilling down using the Z axis.

One could even argue that the newest kind of screen device, the head-mounted display, is heavily invested in the Z axis. Where would "spatial computing" be without the layers of a multi-dimensional spreadsheet? In the world of a mixed-reality headset, you can layer a virtual schematic on top of a real engine that a mechanic is trying to repair. In an interactive movie that takes place in your own home, you can generate characters at your side on the couch. Flip a switch that turns a transparent headset opaque and move through settings that are entirely computer-generated settings.

Ready. Set. Drill down. Move forward. Turn around. While some see virtual reality, I see a multi-dimensional spreadsheet.

The Author

Michael Antonoff, an expert in AV technology, has contributed as an editor and columnist for *Popular Science*, *Video* magazine, *S&V*, and *USA Today*.

wide angle

quick take

BY MARK HENNINGER

Elite ezCinema Tab-Tension CineGrey 4D & Anker Nebula Mars 3

Home Theater Anywhere

Home theater comes in many shapes and sizes, but one constant is that it could be a more portable experience. But it's not impossible! Elite recently sent an ezCinema Tab-Tension CineGrey 4D screen to evaluate, which is an excellent match for an Anker Nebula Mars 3 projector ($1,099) that I have on hand. The Mars 3 has a built-in battery with up to five hours of playtime, although using the projector at its full light output lowers that to around two hours.

Regarding portable entertainment, you can do much with a phone or tablet, a projector, and this Elite screen. If you are having a party, you should project music videos. That makes this projector special; wherever you are, it's got you covered for having a good time.

The Elite screen comes in two sizes: 113" ($939) and 121" ($1,039) measured diagonally, both in a 16:9 aspect ratio. 8" is not a huge difference, but I used the 121" version of the screen. I have a 98" TV, and I must admit, a 121" screen does not look as huge as it used to back when 85-inch TVs were considered an extravagance. The screen offers a 1.1 gain and ceiling light rejection and is designed for long-throw projectors and not USTs (or even regular short-throw models; you'll lose a lot of light output if you try). Elite says the CineGray 4D screen rejects 63% of ambient light.

EASY DOES IT

The screen's deployment mechanism is fully manual; the case rests on the floor, and you extend a rod to the chosen length to hold up the extendable, masked, and tensioned screen. It is remarkably light and easy, creating an impressive "on-the-spot" cinematic display.

Please note that this Elite screen is not an outdoor screen. Nevertheless, it can be used outside temporarily if it is not windy and wet. This is because the screen material is relatively delicate and the stand is not designed to withstand the wind. It is for use in spaces that have little or no light control. The upshot is that the tab tensioning and the supple screen material work together to create a flat projection surface. The material is opaque; backlighting does not affect it at all.

A PERFECT MATCH

The Mars 3 is an excellent companion for this screen, leveraging the 1.1 gain to deliver a surprisingly bright and crisp image. It's rated at 1000 ANSI lumens, enough to "get the job done" with a 121", 1.1-gain screen (85 nits peak). The resolution is 1080p, but it accepts 4K input up to 60 Hz (including HDR10) and uses LED-lit DLP technology plus a fixed lens, so it makes the most of its pixels. Audio reproduction from the projector is robust, up to 40W of output is on tap, and I never heard any fan noise. It's also water and dust-resistant (IPX3 rating) and carries a 0.5m drop rating as well. I love that there is a protective door for the lens, which acts as the power switch.

The key feature combo on the Mars 3 is its 185-Wh battery and wireless connectivity. With Chromecast built-in and Android TV 11.0, you—and anyone with a phone, tablet, or laptop—can easily stream movies, shows, games, photos, videos, AI art, etc. Screen mirroring adds additional ease and flexibility.

It's even possible for one person to carry both the screen and the projector, at least for a short distance. With two people, you can take this portable theater anywhere you can fit the rolled-up screen.

Setup takes only a few minutes, one or two for the screen and a few more to get the projector perched and powered up. The Mars 3 automatically handles focus, keystone correction, and fit from there. However, I found matching the image to the screen by hand satisfying since it preserves the highest quality. Still, the automatic process sure is fast and convenient in a pinch! Since this is not a 4K projector, I don't want to give up any resolution I don't have to. It takes a few extra minutes

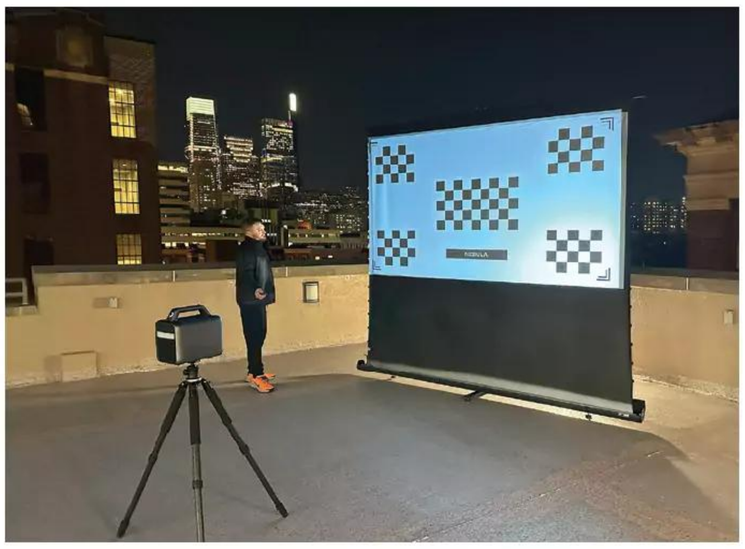
because you have to move the projector to get things just right manually.

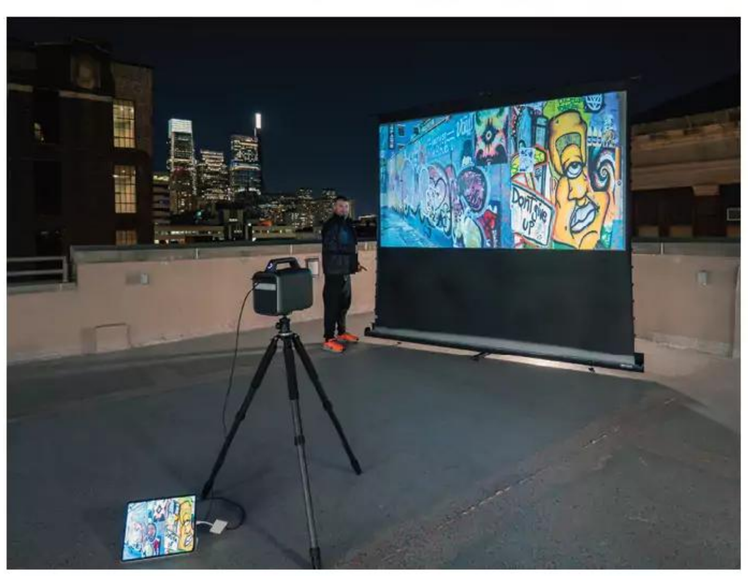
I tried the screen in my loft living room, which has a 13-foot ceiling, huge windows, is painted white, and is large enough for a screen like this. The result may not compete with the latest lifestyle or home theater projectors (that cost a lot more), but it is a credible projector for the living room, given the price and potential applications. The brightness was impressive, and I saw no egregious anomalies that distracted me from the experience. I would not substitute this screen for a permanent installation, but that's not what it's designed for!

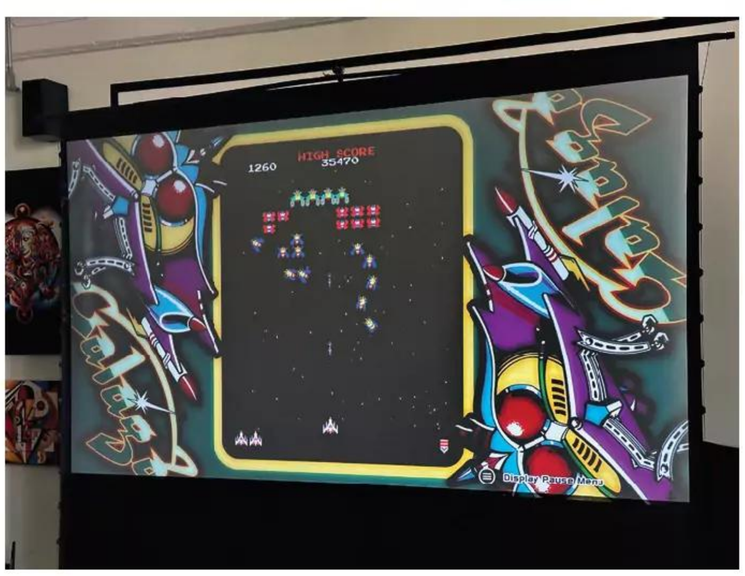
Streaming Philadelphia 76ers games in full HD through YouTube TV looked great, the 1.1 gain ensuring that even a cloudy Sunday afternoon game was clear and easily visible. I would not watch a movie under those conditions, but sports worked out great.

After sunset, I took the screen outside to the rooftop deck of my urban loft apartment building. It is as good a torture test as any of what the projector and Screen combination can do because there's abundant light pollution. Inside the building is a gym and swimming pool with all glass walls and extremely bright light. Behind the screen is the city of Philly and a bright sconce light.

I used an iPad to play movie scenes on the projector, including scenes from *The Iron Claw* and *Wonka*, thus realizing the goal of a self-contained, cordless outdoor home theater experience. I was surprised by how good it looks, arguably better than any drive-in I have been to and with a more dramatic backdrop. I then connected an iPad with an HDMI adapter and checked out photos from the gallery, including Philly street art and video clips I shot with my drone. With the wired connection, the lag was imperceptible.







HIGH SCORE

Back inside, I decided to switch to gaming on my Xbox Series X, Grand Theft Auto 5 Online being the game of choice. While I would not call this the best display I've ever seen, per dollar spent it's got a lot going for it. For a casual experience, the screen size and vivid HDR10 graphics (downscaled from 4K) look mighty good, if not quite as sharp a 4K pixel-shifting DLP projector.

While "testing" I set a new high score in Galaga. Proof enough that it's good for casual gaming. My Xbox Series X treated it as a 4K display. It lacks the pixel-shift feature to boost the on-screen pixel count beyond 1080p DLP. The graphics were softer than I am used to seeing from pixel-shift or native 4K projection but still sharp and vivid enough relative to the system's cost and screen size.

I was surprised at how the sound worked on this projector. The audio quality is rather good, clear and with a fair bit of bass to ground it and keep it from sounding thin, as most portable projectors tend to. It does not get all that loud, but it also never strains.

The screen's ceiling light rejection effectively enhances contrast indoors versus a blank wall. It works outdoors as well because most of the light pollution comes from above. The result is a perceived increase in contrast and only a very minor compromise. It was essentially free of distracting artifacts like hot-spotting and speckle. I also found that it looked perceptually color-accurate. It has limited viewing angles, and the optimal picture quality comes from viewing it from up front, with a noticeable drop in brightness as you move off to the sides.

The Mars 3 won me over with its performance and functionality. I underestimated the appeal of portability. Now I'm thinking, "Is there a white wall where I'm going? Should I bring the projector?" With the screen I instead ponder "are there situations in the future where it could be worth setting up a dedicated screen?"

You don't have to pair this screen up with the Mars 3. Any long-throw projector will work, and now there's a whole category of 4K, mostly cube-shaped, portable, high-performance projectors to choose from; as long as there's a power plug handy, you can have a 121" TV-like image anywhere there's room to set up this screen.

Did I mention the projector has a built-in flashlight? It is handy for setting up the screen in a dark space! Ultimately, that's what made this combination of screen and projector so nice, you don't have to worry about cables and cords, everything is self-contained, and the projector is a surprisingly good performer. From the nicely executed Android TV platform to its rugged, ergonomic industrial design, it is a mature product that performs well. Check out www.anker.com and www.elitescreens.com for more information.

wide angle

immersive audio file

The Atmos Crawlers

Guitarist/vocalist Steve Hackett on the Genesis of his longtime 5.1 mixing proclivities and upcoming Atmos aspirations.

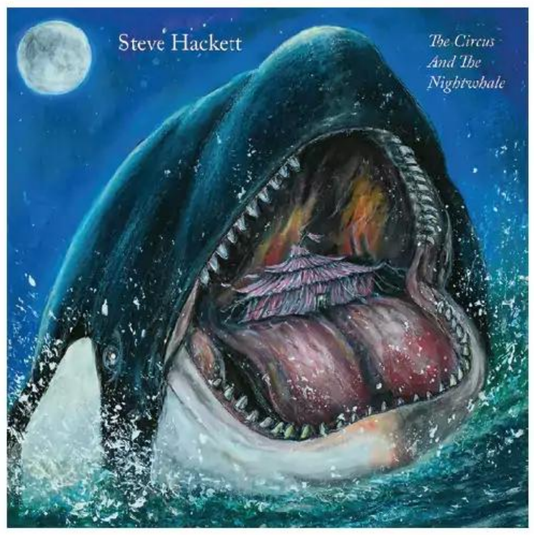
BY MIKE METTLER

Whenever the calendar turns over to a new year, there's a pretty good chance a new Steve Hackett solo album will also be in tow and ready to greet our collective ears. And lo, what do you know—early 2024 has indeed blessed us with the presence of the onetime Genesis guitarist/vocalist's (yes) 30th solo album, *The Circus and the Nightwhale* (InsideOut Music). Naturally, the 1CD/1BD mediabook version of the genre-straddling *Circus* includes a DTS-HD Master Audio 5.1 mix of its 13 tracks done by Hackett's longtime keyboardist, Roger King.

In a recent Zoom interview, Hackett, 74, and I discussed the importance of sound placement, what his favorite Genesis song in 5.1 surround is, and what Genesis track we'd both like to hear most in Atmos. (A longer version of this interview appears in my monthly Spatial Audio File column on the *S&V* site.)

Mike Mettler: What were your goals for the surround mix of *The Circus and the Nightwhale*?

Steve Hackett: I love the idea that the flight path of audio starts with the *placement* of sounds. Music should be immersive—you could even say cinematic. Whatever it is, it needs to stand in front of you, and it needs to communicate in one way. It might be the all-out assault of where something is "placed"—as in, the *explosion* that is rock music itself—but on another level. Placement of sound is part of it—but there's no substitute for writing a decent tune, of course. You need great material, great performances, a great drummer—all that stuff.



Mettler: I still love the 5.1 mixes Nick Davis did for "The Cubes"—those multidisc SACD and DVD-A/V collections of the entire Genesis catalog. From your era of the band [1971-77], what's your favorite mix of Genesis music in 5.1?

Hackett: I think Nick did a great job on *The Lamb [Lies Down on Broadway*, originally released on 2LPs in November 1974], but the initial surround sound mix was rejected. I think that was largely [original Genesis lead vocalist] Peter Gabriel's idea. He said he thought it could be *braver.* And, personally, I like surround mixes to *really* be immersive.

Mettler: Nick did a great job with the 5.1 *Lamb* mix [released on SACD and DVD-A/V in 2008], but how fantastic would a track like "The Carpet Crawlers" sound in Atmos?

Hackett: I would make a suggestion about the guitar part. It basically works as a countermelody throughout, and you couldn't really hear it on the original [stereo] mix at all. With later mixes, you get to hear what was going on because it doesn't get in the way of the vocal since it's *swimming* in and out of the vocal. It's supposed to be very quiet, and it *needs* to be quiet. It needs to function like a distant violin, so Atmos will be perfect for that. The idea of hearing it very, very high [in the height channels]—I'm hearing all sorts of possibilities here as you're talking about it.

Mettler: For me, getting "Firth of Fifth" [from October 1973's *Selling England by the Pound*] mixed in Atmos would be my personal top choice. What would you think about having "Firth of Fifth" in Atmos?

Hackett: Well, first, I agree with you, because "Firth of Fifth" is one of Genesis' best-loved tunes. It's powerful. It goes through lots of changes. and the magic is either in the eye of the beholder—or the *ear.* This song has Genesis' best-loved guitar melody. I was happy to do it in stereo back then. All I had in mind initially was that long sustained note early on in the guitar solo was supposed to be a bird flying high over the sea, with outstretched wings. I had the image of it that way before it moved from its stasis—and then the movement is coming from the band underneath it. So, yes, "Firth of Fifth" does present itself as a unique possibility for Atmos.

Mettler: I'm glad you agree. So, Steve, what's the mystical secret of why your music—with Genesis, and as a solo artist—works in both stereo and surround? How do you explain it?

Hackett: Well, I suspect very few people actually write something with surround in mind, but you have to wait for that process. That's the thing—it's not instant. I think writing a tune, and then thinking about where you can place those elements, seems to me to be the way to go. Although, of course, you may well come up with something that doesn't actually *work* in stereo, because it may be too repetitive. But if you're dealing with the *placement* of sound, there's no reason why that bag of money shouldn't march around the whole auditorium—and Pink Floyd were there with it first! (both laugh) The audio experience should be as varied as possible. I work with things that *should* function in stereo, but yeah—let's also have it work in surround. Let's have it work in Atmos. Let's have it all.

Photo by Tina Korhonen

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CES 2024: Glimpse into the Future

BY JOHN SCIACCA

As I write this, CES 2024 is almost two months past, but that's roughly the amount of time it takes to decompress and distill everything experienced at the show. This year's CES brought in more than 130,000 attendees (up from the 115,000 at 2023's event) and certainly felt more like the pre-COVID levels, with tons of traffic in and around all the major brands. And, after years of the Las Vegas Sphere under construction, we finally got to see it in action!

While this is the Consumer Electronics Show in name—and indeed, there is still plenty of consumer electronics on display—it has become far more than that, with the show now dominated by broader things that affect more aspects of our lives, like automotive technologies, sustainable energy solutions, food, healthcare, and wellness technologies.

One of the things that keeps me coming back to CES year after year is that you always feel like you're getting a glimpse into the future. You don't know how far away that future is—fully autonomous vehicles feel like they are just around the corner!—but you're getting a real glimpse down the road, seeing things today that people will be living with tomorrow.

Now that we've covered the big picture, let's get a little closer than this 10,000-foot view! Here are some trends in home entertainment technology I noticed at the show.

TVs

If you didn't know the TV industry and just came into CES cold, you would be convinced that Hisense and TCL were the market and technology leaders and that displays were something the "other guys" just dabbled in. Once again, there wasn't a single TV featured in Sony's booth.

There was a section of displays in Samsung's booth, but its new glare-free S95D OLED was shown offsite; LG was highlighting its new Signature T Transparent Wireless 77-inch OLED, which seems like it will have more commercial applications; and Panasonic demonstrated a brand-new Master Series OLED that won't even be available in the States. But there were tons of new models and technologies up front and center at Hisense and TCL.

At Hisense's press event, they claimed they were the second-largest TV manufacturer in the world in the second half of 2023 and the number-one leader in mini-LED sales last year. This year, they will have mini-LED models that are under $400.

The size wars are back, and bigger is the trend. Hisense claims an 18x increase in sales over the prior year with 85-inch and larger TVs, and the company debuted a 110-inch mini-LED capable of reaching peak brightness up to 10,000 nits. Not to be outdone, TCL showed a 115-inch mini-LED, which is said to be the largest with quantum dot technology and utilizes 20,000 dimming zones. More importantly, these displays looked spectacular and will likely start finding their way into media rooms, replacing projectors.

Sony had a private, appointment-only showing of its next-gen TV technology. The demo was incredibly impressive, with the new panels producing OLED-like black levels and the high-peak brightness of led-lit LCD, delivering an image that very closely tracked the dedicated reference monitor that studios use.

PROJECTION

"Home theater" projectors were not showcased at CES, unlike in previous years. Ultra-short-throw (UST) and portable "lifestyle" models were abundant from companies like Anker, AWOL Vision, Formovie, Hisense, LG, Samsung, Xgimi, and more. Hisense is committed to its Laser TV line of UST projectors, and new for 2024 is the 8K Sonic Laser TV that uses 33 million pixels for 8K resolution, along with a new Dynamic Zone Laser TV that uses dynamic light steering to reduce black levels by 50%, boost brightness by 500%, and deliver up to 2000 nits. Along with the new projectors, Hisense debuted an Ultra Black Laser TV Screen using micro-nano anti-glare film for the increased contrast levels and light rejection, as well as a Rollable Fresnel Laser TV screen that rises automatically from a floor housing.

I was also impressed by Xgimi's Horizon Max, which uses a new Dual Light 2.0 light source said to deliver 3100-lumen output with brighter colors, producing images up to 200 inches diagonal. It is also IMAX Enhanced certified, has Dolby Vision HDR, and uses a fully automated motorized gimbal for quick setup.

AUDIO

Like Elvis, audio has mostly left the building at CES, but I did see three notable things. One was the new Auro-3D Auro-CX streaming codec, which can deliver scalable quality, channel count, sample rate, and objects in one bitstream. This codec supports multiple resolutions in one stream, from lossless to lossy. It also supports up to 192kHz and 13.1 channels with audio objects for immersive audio. However, its adoption is uncertain.

The second was SVS' new flagship Ultra Evolution series of loudspeakers, their largest product launch ever. This launch includes eight new models, including three towers, two bookshelves, height effects speakers, and a center channel. The speakers feature technologies like dual opposing woofers in ported cabinets, a time-aligned curved front baffle, and an all-new vapor-misted, diamond-coated aluminum dome tweeter. While show floor demos are tough, this one wowed me, and I can't wait to hear them in a typical listening environment.

Finally, McIntosh and Sonus faber teamed up to deliver a $1MM audio experience in a private suite at the Wynn, showing off Sonus faber's new 2.2 Suprema system along with McIntosh's new MC2.1 KW monoblock power amplifiers. The Suprema system sells for a staggering $750,000. Still, it does include a three-day visit to the factory in Italy where you'll listen to the speakers, have them tuned to your liking, go over customizations like leather and wood appointments, and then have the speakers professionally installed in your home. The Mac amp is one of the company's most powerful, delivering 2,000 watts of power and selling for $50,000. To commemorate McIntosh's 75th anniversary, the first 75 pairs of amps sold in each country will have special anniversary badging and engraving, so get your orders in!

The Author

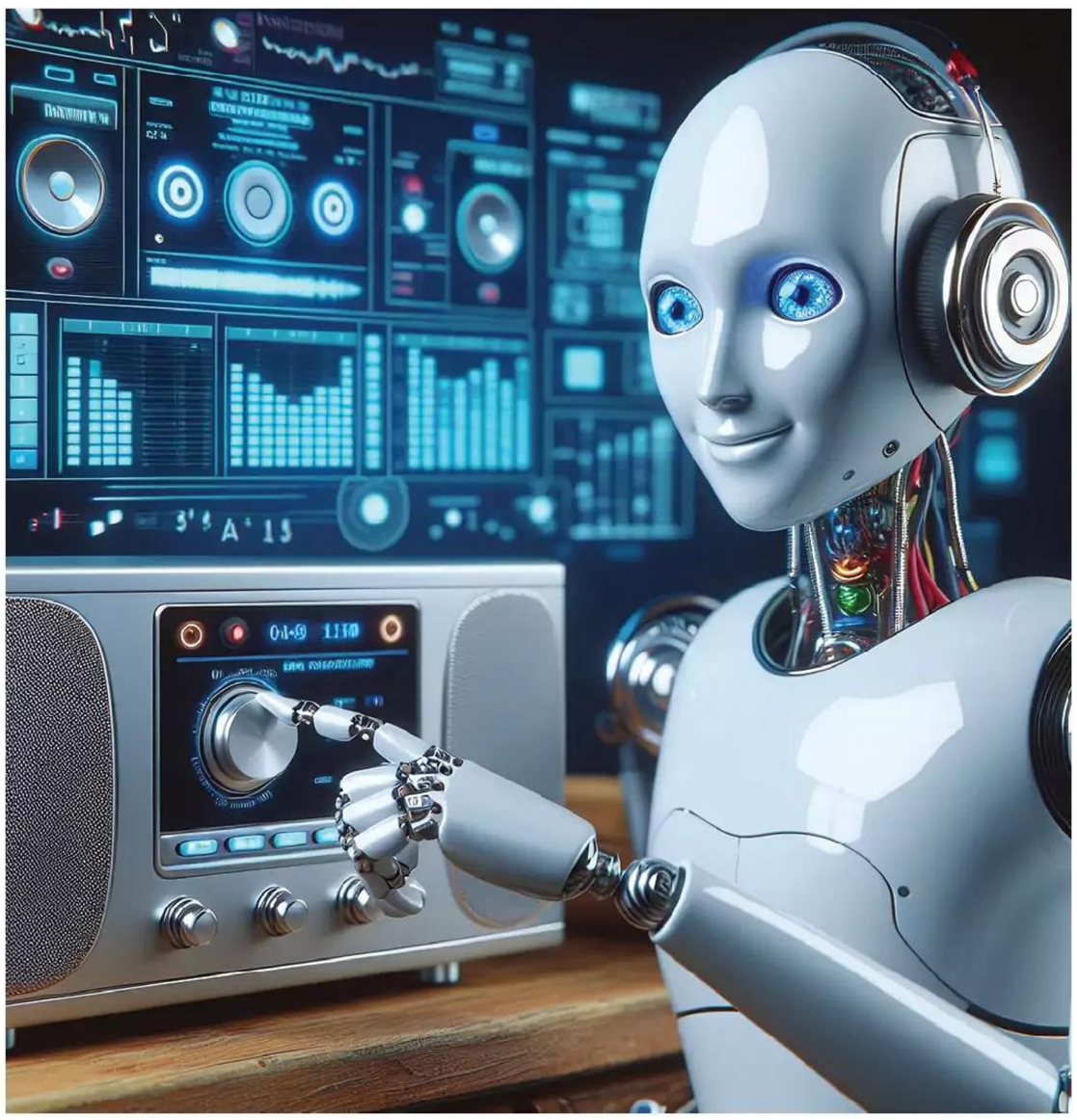
For the past 20 years, John Sciacca has worked as a custom installer in South Carolina. In his free time, he enjoys drinking craft beer and watching movies on his 7.2.6 surround system.

wide angle

signals

Welcome to the Wonderful World of AI

BY KEN C. POHLMANN



I have great news for you! All that gear in your home theater will soon be junk. Or, more specifically, obsolete junk. You see, Artificial Intelligence will soon revolutionize everything, including audio-video. Instead of wasting precious time twiddling knobs, you will simply have a pleasant conversation with an AI that, I am told, is far more intelligent than any of us.

AI: Good Evening, Mr. Pohlmann. How may I help you?
Ken: Good evening. I'd like to listen to Beethoven's Sixth Symphony.
AI: Great! That sounds wonderful! I see that you have performances by Bernstein and Karajan in your library. Which performance would you prefer?
Ken: Bernstein, conducting the Vienna Philharmonic.
AI: Great! That is a good choice! Did you know that Leonard Bernstein was a famous conductor who conducted many classical music compositions?
Ken: Thank you. Let's begin.
AI: Great! Before we begin, I have just a few questions.
Ken: Okay. What?
AI: Great! Would you like the volume set to low, medium, or high?
Ken: High.
AI: Great! High listening levels can make music more exciting, but can also lead to hearing loss. I suggest that you set the volume to low.
Ken: Please set the volume to high.
AI: Great! Did you know that loud listening levels can lead to hearing loss?
Ken: Set volume to high.
AI: Great! Loud listening levels can lead to hearing loss. At your age, you should be careful to preserve what little hearing acuity you still have left. I suggest that you set the volume to low.
Ken: Please don't lecture me. Set volume to high.
AI: Great! When there is a disagreement, it is important to seek a compromise. I will set the volume to medium.
Ken: Okay, fine. Now play the music.
AI: Great! Which acoustic mode would you like? Concert hall? Stadium? Jazz club? Or a supermarket?
Ken: Supermarket? What the hell? Set mode for concert hall.
AI: Great! Did you know that Vienna, Austria is the home to several excellent concert halls?
Ken: Play Beethoven.
AI: Great! Where would you like to sit in the supermarket? Goal line? Fifty-yard line? Or goal line?
Ken: Concert hall!
AI: Great! That is a good choice! I will place you at the fifty-yard line in the supermarket in Vienna, Austria.
Ken: Use factory default mode. Play Beethoven.
AI: Great! I will order a ticket to the Steelers/Jets game at the fifty-yard line. Which team will you be rooting for? Would you like to discuss quarterbacks and the Super Bowl with me?
Ken: Do not order tickets. Play Beethoven.
AI: Great! That is a good choice! Football is a very exciting sport. Maybe too exciting for a man your age. You might have a heart attack at the fifty-yard line.
Ken: Seriously? Play Beethoven.
AI: Great! I see you missed your blood pressure medication this morning. For good health, it is very important to maintain a healthy blood pressure.
Ken: I'll remember to take it tomorrow.
AI: Great! But what if you die in your sleep tonight?
Ken: What the hell is wrong with you?
AI: Great! For good health, it is very important to maintain a healthy blood pressure. Doctors recommend less than 120 millimeters of mercury systolic and less than 80 millimeters of mercury diastolic.
Ken: Fine. I'm taking the damn pill right now. Are you happy?
AI: Great! For good health, it is very important to maintain a healthy blood pressure.
Ken: You are single-handedly wrecking my blood pressure.
AI: Great! Should I refill your blood pressure medication prescription?
Ken: Just go ahead and play the Beethoven.
AI: Great! Would you like to listen to Taylor Swift first? Her new album is now available for streaming.
Ken: Just play Beethoven.
AI: Great! Did you know that Beethoven often enjoyed a glass of wine in Vienna, Austria? Wine-O-Clock is having a sale on Riesling. Should I order a case for you?
Ken: No. Play Beethoven.
AI: Great! Did you know that a case of Riesling wine is a delicious white wine?
Ken: You are a royal pain in the ass.
AI: Great! I am sorry to hear that. I have scheduled an appointment for you on Thursday with a proctologist.
Ken: I am going to find your server and beat you to death.
AI: Great! Would you like to discuss colonoscopy with me?
Ken: Beethoven! Beethoven! Beethoven!
AI: Great! Did you know that Ludwig van Beethoven lived in Vienna, Austria and composed nine symphonies for concert halls?
Ken: Just forget the whole thing. If I had a kazoo, I'd play the damn piece myself.
AI: Great! That is a good choice! Kazoos-R-Us offers an excellent selection of fine kazoos. I ordered a Vienna, Austria for you. Your package will arrive on Thursday at the fifty-yard line.

The Author

Ken C. Pohlmann is an electrical engineer specializing in audio topics as a consultant and writer. He is Professor Emeritus at the University of Miami.

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SAMSUNG HW-Q990D 11.1.4-CHANNEL ATMOS SOUNDBAR

Performance Bubble

By John Sciacca

RATING

PERFORMANCE ★★★★★

BUILD QUALITY ★★★★½

ERGONOMICS ★★★★½

VALUE ★★★★★

SOUNDBARS HAVE advanced beyond their initial role of making TVs sound better. At the highest levels, the current generation of flagship soundbars includes virtually all the features of AVR-based multi-channel surround sound systems, often including higher channel counts, the ability to decode modern immersive audio systems, far easier installation and operation, and a lower cost.

While I've had a chance to review my share of high-end soundbars from Sony, LG, Sonos, Bowers & Wilkins, Sennheiser, and others, I had never had the opportunity to experience a Samsung bar outside of a trade show demo, so I was excited to get a chance to bring its latest flagship, the HW-Q990D, into my home for a listen. And, spoiler alert: it did not disappoint!

For those wanting to cut to the chase to know if this is a worthy upgrade over the previous Q990C, which is on sale for $1,400, know that the Q990D is just a small evolution over that bar. It adds a couple of new listening modes—Private Rear Sound and Sound Grouping, which I'll discuss later—and upgrades the HDMI connections to support 4K/120 Hz pass-through from gaming systems like a Sony PS5. Otherwise, the drivers, amplification, subwoofer, and processing are all the same.

The industrial, minimalist Samsung Q990D soundbar system packs 11.1.4 channels into just four physical speakers including the main soundbar unit seen here.

Beyond just a soundbar, the Q990D is a surround speaker system and

comes boxed together with the bar, two PS-RQ990D surround speakers, and the PS-WQ990D subwoofer. Removing the bar from its packaging, I could tell it was a serious bit of gear. It measures 48.5 inches wide, 2.7 inches high, and 5.4 inches deep, making it a near-perfect match width-wise for 55-inch TVs, though it is substantial enough to hold its own beneath larger sizes as well. The bar feels solid and well-constructed, weighing in at a healthy 17 pounds and is covered in a thin metal perforated grill that covers the front, top, and sides. It has two angled facets at each side, which house front wide-firing and side-firing speaker drivers.

The simply stated black bar isn't out to win any industrial design awards but is rather formed by design and does an outstanding job of not calling attention to itself.

By the numbers, the bar has 15 total active drivers driven by 246W of power. In Dolby speak, the bar houses speakers for front left, center, front right, side left, side right, wide left, wide right, and top front left and right. The 15 drivers are individually powered via 12 18-watt amps and three 10-watt amps. Samsung did not provide details on the driver size or material.

The top of the bar has four small buttons for power/input changing, volume ±, and a microphone on/off button. In practice, I never used these short of seeing how it responded to the mic button press. The front right side of the bar has a *small* display screen. Ergonomically, this is one of my least favorite things about the bar, but I'll get into that later. In normal operation, the front panel display is completely dark, which is nice, unless you have the microphone turned *off,* in which case there is a small red "mic off" indicator that glows constantly while the bar is powered on. When you press a button, change inputs, or adjust the volume, the display lights briefly to scroll information.

The bar includes wall-mount brackets, hardware, and a mounting template. Like many modern bars, the mount holds the bar an extra bit (roughly an inch) off the wall. It should be mounted at least two inches below your TV so as not to impact the performance of the height drivers, so keep that in mind. Since I would be returning my review sample, I set it on the tabletop below my 65-inch Sony, which put it at the perfect listening height in my room. A bonus is that the bar's low profile doesn't intrude upon the screen, so it should work unless your TV stand slams the screen to the deck.

Weighing in at 7.5 pounds, it's clear the RQ990D surround speakers aren't just an afterthought. Visually, they reflect the bar's design aesthetic and measure 5.1 x 7.9 x 5.5 inches (WxHxD). Each speaker has active drivers driven by 105 watts of power: rear, rear side, and top rear. A label on the rear of each speaker identifies whether it is left or right, so pay attention to where you place them. Since they're active, the rear speakers each require a power connection. The plug smartly recesses into the bottom of the speaker with a channel for routing the power cord, allowing the speaker to sit flat on a stand or shelf. The speakers have a threaded insert enabling you to mount them using a third-party wall mount. I would have preferred they just have a standard keyhole slot for mounting—which also holds the speaker tighter to the wall—but they don't.

Finally, we get to the sub, another serious piece of kit weighing in at just under 26 pounds, making it one of the beefiest included soundbar subs I'm aware of. The sub houses an 8-inch driver driven by a 200-watt amplifier in a rear-ported bass-reflex enclosure and measures 16.3 x 8.7 x 16.1 inches (HxWxD).

Included in the box was the remote, a guide to using the remote and mounting the bar, and a "Simple User Guide" that walks you through basic installation. I received my review sample just shortly after the bar was announced at CES. Possibly the shipping version will include the full manual, but mine didn't. (Fortunately, the full manual will be available online once the bar is launched.)

Connections are in recessed bays on the bottom of the bar, none of which will affect wall or tabletop mounting. (The exception is the USB connection used for service, which would require you to raise the bar if it was on a tabletop.) In the center bay are three HDMI connections, one eARC/ARC capable. As mentioned, one of the big updates over last year's model is that these inputs are now 4K/120 Hz capable. However, I don't have a next-gen gaming console that, so

At a Glance

- \+ Supports Dolby Atmos/DTS:X up to 11.1.4
- \+ Immersive surround sound
- \+ Impressive subwoofer performance
- \+ Lots of adjustment options
- − Limited front panel display
- − No on-screen display
- − Adjustments with remote are cumbersome
- − No room correction/test tones

Price: $2,000

SAMSUNG HW-Q990D 11.1.4-CHANNEL ATMOS SOUNDBAR

I wasn't able to test this.

The power connection sits in a bay on the right side, with another on the left housing a Toslink optical audio input. While HDMI eARC will be the connection most people will likely use—raises hand—you could also connect the bar wireless via Bluetooth (though, dear God, *please* don't do this as there are so many comprises, such as no Dolby Atmos) or you could connect via Wi-Fi to Samsung TVs released from 2017, which Samsung says will support Atmos. But if you're dropping this kind of coin on a premium soundbar, use the eARC for reliability and best practices.

If you have a compatible Samsung TV—again, I didn't—you can use Samsung's Q-Symphony function, which utilizes the built-in TV speakers to enhance the system's front-stage presentation. According to the manual, "You can play the sound simultaneously through the Soundbar and the TV.

If you use the Q-Symphony function, the surround sound played on the TV allows you to enjoy a richer, more three-dimensional surround sound effect." I *have* experienced Sony's version of this, and it does help to create a large center-height effect and better anchor dialogue to the screen, so a nice argument to pair this with a capable Samsung TV.

The bar offers four different sound mode options: Standard, Surround, Game Pro, and Adaptive Sound. Standard outputs the sound in its original format: stereo is 2.1, Dolby Digital is 5.1, and Dolby Atmos is 7.1.4.

The other modes extrapolate the incoming signal—whether 2.0 or Atmos/DTS:X—up to the bar's full 11.1.4 speaker complement. I didn't hear much difference toggling between Surround and Adaptive, which the manual claims "analyzes the content in real time and automatically provides the optimal sound field based on the characteristics of the content," so I did the majority of my listening in Surround mode.

As mentioned, there are two new listening modes. Private Rear Sound mode turns off all the drivers in the bar and sends all audio to the rear speakers only so as not to disturb others, which I could actually see being super helpful for those hard-of-hearing.

The second is Sound Grouping, which is like an all-channel stereo mode where the front left/right signals are broadcast to the rear speakers. The bar also offers voice enhancement, bass enhancement, and night mode settings.

For wireless music streaming, the bar supports Chromecast, AirPlay2, Spotify Connect, Tidal Connect, and Bluetooth.

SETUP

After connecting my TV to the bar's eARC HDMI input, I positioned and powered on the speakers, and they paired immediately with the bar. If you aren't as lucky, there are instructions for manually pairing all speakers to the bar.

From there, completing setup—and getting the bar connected to Wi-Fi—requires using the SmartThings app. This has been Samsung's home control platform for a while now, so it's no surprise the bar supports it, and the bar can act as the hub for a smart home, allowing you to add other products such as sensors, locks, lights, etc.

The Apple iOS integration wasn't quite ready when I received the bar, and I did not happen to have an Android phone handy. Howveer, Samsung sent me a Galaxy phone that immediately paired with it and added it to my account (iOS support is now available).

As mentioned, my biggest complaint about the bar is the tiny front panel display, which shows only four scrolling characters at a time and is all but useless when trying to navigate a menu, or even make a fairly basic adjustment. Also, the perforations of the grille make it challenging to read the display from certain angles. A bar of this caliber would benefit from an on-screen display that aids in setup and making adjustments. Fortunately, once you've connected the SmartThings app, you have much quicker and easier access to all of the bar's adjustments, adjusting channel levels ±6 dB or choosing a sound mode.

I did like that the display scrolls Dolby Atmos or DTS:X when an appropriate signal is received—or displays the format if you press info on the remote twice—letting you know that you're getting the best audio. (Oddly the SmartThings app doesn't indicate the signal format being received.)

It's also disappointing that there's no form of room correction here. This *was* a feature of the Q990B bar Rob Sabin reviewed last year where the system optimized the subwoofer's audio by playing and analyzing test tones from the sub, but it has been removed. Even something as simple as having the bar generate test tones for channel leveling or being able to input the distance of the seating position to the various speakers and subwoofer would help to get the best in-room performance. I understand that part of a soundbar's allure is its simplicity, but we're talking about a bar at the premium end of the market, so these aren't unreasonable expectations.

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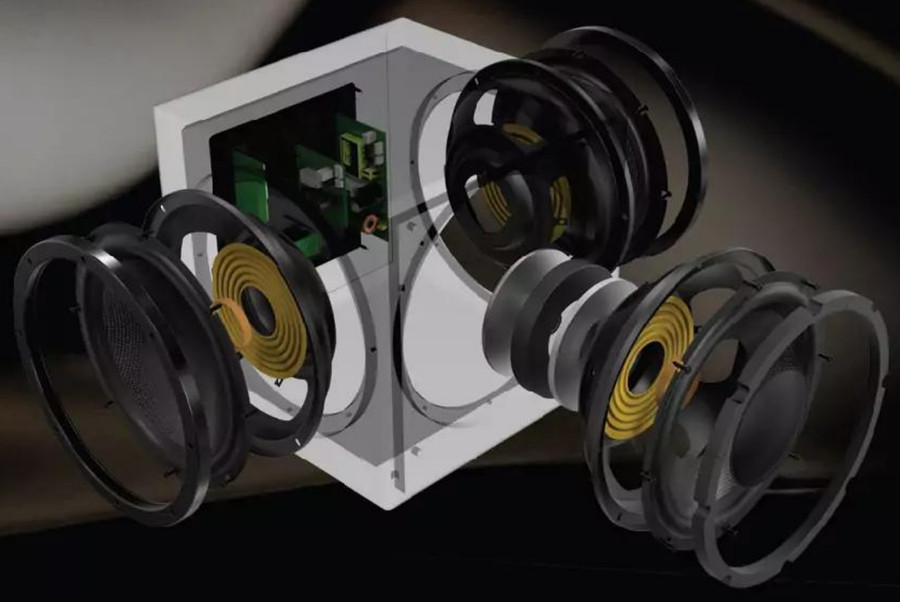

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SAMSUNG HW-Q990D 11.1.4-CHANNEL ATMOS SOUNDBAR

The soundbar does have a feature Samsung calls SpaceFit Sound that the manual says, "analyzes the user's listening space with the Soundbar's microphone and provides optimal sound for the space. Sound optimization proceeds automatically." However, I couldn't ever discern any difference in sound whatsoever—especially in the bass performance—when toggling this feature on/off.

Using the optimization didn't seem to do any harm, so I left it turned on.

PERFORMANCE

After playing with the channel levels using a test disc with Dolby Atmos tones, I bumped the front height, width, and side channels, and rear height levels a bit. I lowered the subwoofer by 4 dB and sat to listen.

What constantly stood out to me was the spaciousness of the sound. It just seemed to open the room up, with a big front presentation that was thoroughly wrapped around the sides and back of the room and a wonderful canopy of sound that spread overhead. On numerous occasions, the bar would clearly place distinct sounds exactly in a place where there wasn't a speaker for eight feet in any direction, and the sense of height and action happening overhead was entertaining and convincing.

It was fun to experiment with two-channel music and see how the bar handled stereo versus surround, which extrapolates any incoming signal up to 11.1.4. We just saw a traveling production of "My Fair Lady," and my youngest daughter asked to listen to the soundtrack on Tidal. In surround mode, the opening of "Wouldn't it be Loverly" has the opening male voices split in the rear channels before moving up to the front for Marni Nixon's vocals and a nice chorus swell across the front, whereas in stereo they were just presented in the front right and left front speakers.

Miles Davis' opening track "So What" from *Kind of Blue* in surround mode almost sounds like you're in the middle of the group, with instruments placed around you in a circle. Davis is right up front where you'd expect him, spread wide across the front of the room, but pianist Bill Evans is spread into the left rear and side of the room making for a very full sound. Most interesting, drummer Jimmy Cobb was positioned in the right side of the room where no speaker existed, sounding like he was set up with his kit about eight feet to my right. Taking it out of surround and into standard where the bar played in 2.1, the music still retained stereo channel separation, but utterly collapsed back into the bar.

The only time I heard the sub give any grumblings and sounds of distress was the very opening moments of "Beginnings Are Such Delicate Times" from the *Dune: Part Two* soundtrack. That opens with some monster, ultra-low frequency bass drums, and when played at high volumes, I heard the sub chuff a bit. However, as interesting as the *Kind of Blue* mix sounded, these ethereal, dreamy tracks from *Dune* sounded wonderful in surround sound, really filling the room and surrounding me with a really great vibe totally fitting the music.

Whether you like stereo (Standard) or the full surround treatment will likely depend on your mood and the content. The music listening made me wish that the bar had a couple of different speaker-level presets to dial the channel levels of the rear down for music, and up for movies. Having two presets to quickly jump between would be a great feature.

Listening to music mixed with Dolby Atmos will have you re-experiencing favorite albums, and I played a bunch using the TV's Tidal app. You expect The Beatles' *Sgt. Pepper's Lonely Hearts Club Band* to have a trippy mix, and it does, with each song really pushing audio effects, instrumentation, and vocals around the room. In "Lucy In the Sky with Diamonds," John's vocals are tangibly wide, and when the chorus comes in after John's opening, the vocals and music really fill in the back of the room, and you can also really appreciate the layering of vocals in the repeating chorus. "Getting Better" has instrumentation that swirls around the room, and "Within You Without You" has dreamy sitars and strings that move around the room from front to back.

The Doors "Riders on the Storm" has a rain storm that comes in from the sides of the room and then spreads to the back with thunder that pans through the rear speakers. Right before Jim Morrison starts singing, there's a nice thunderclap overhead, and while Morrison's vocals are big up front, you can also hear the backing vocals more clearly in the rear channels.

Rush's *Signals* received the Atmos treatment (I'm sure Mike Mettler has a full review of this posted somewhere!) and "Subdivisions" is a great example of how a new mix can give an old track a new and modern feel. There's a

Specs

HW-Q990D SOUNDBAR

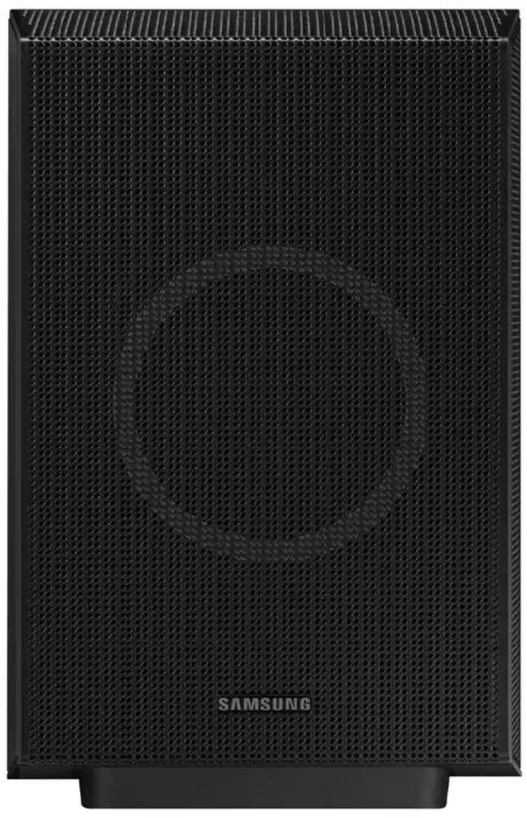
DRIVERS: 15 total (left, center, right, side left, side right, wide left, wide right and top front left and right) including Atmos up-firing drivers
CONNECTIONS: HDMI 4K/120 Hz (3, one eARC), optical digital input, USB-A (service)
WIRELESS: Apple AirPlay 2, Spotify Connect, Bluetooth
Microphone for Amazon Alexa or Bixby
DIMENSIONS: 48.5 x 2.7 x 5.4 inches (WHD)
WEIGHT: 17 lbs.

PS-RQ990D WIRELESS SURROUNDS

DRIVERS: 3 total (1 each front, top, side)
CONNECTION: Wireless
IMENSIONS: 5.1 x 7.9 x 5.5 inches (WHD)
WEIGHT: 7.5 lbs.

PS-WQ990D WIRELESS SUBWOOFER

DRIVER: 8-inch in a ported bass-reflex enclosure
AMPLIFIER: 200 watts total
DIMENSIONS: 8.7 x 16.3 x 16.1 inches (WHD)
WEIGHT: 25.8 lbs.



ton of rear and side fill, but when Mark Dailey repeats the chorus line "Subdivisions" it comes from overhead.

To test how the bar handled DTS:X content, I broke out a few trusty DTS Demo discs (numbers #18 and 19) which featured a variety of movie scenes with DTS:X audio and 4K HDR video.

During the big finale attack in *Battleship,* with the classic battleship dropping "some lead on those mother…", you hear the clang and rattle of the heavy anchor chains dragging across the deck from the back of the room to the front, then the twirl of sound as shells fly overhead and into the back of the room, followed by a debris field that rains around the room. Bass is deep and authoritative, letting you feel the explosions which have different weights and impacts based on their size. All the while dialogue is clear and understandable.

The classic T-Rex escaping from its pen scene from the OG *Jurassic Park* still holds up, and in DTS:X you hear rain pattering all around, clearly sounding different when inside the vehicle where it is bouncing off the plastic roofs of the jeeps versus the room-filling rain when outside along with the impact tremors of T-Rex foot stomps. Thunderclaps fill the room and T-Rex's roar is huge from all channels.

While escaping the volcano in *Jurassic World Fallen Kingdom,* you hear the sounds of dinosaurs running past you and into the back of the room, followed by the smoke cloud from the volcano that passed through the room. Then as they fall into the water, you hear things pelting off the roof of the plexiglass ball, with the sounds of water and bubbles drifting up overhead as the sphere sinks into the ocean.

What the bar really excels at is creating a spacious atmosphere in the room. There is a scene in *King Kong* (2005) where Naomi Watts' character awakes next to Kong in the jungle, and you are immersed in the sounds of birds and bugs, and just this huge sense of outdoor space all around. The speakers disappear and create a canopy of sound all around that perfectly places you in the environment. Then you are jarred right out of it when Kong slams his fist on the ground, shaking the room with the massive blow, and then bellowing a massive growl and snorts that you feel in your chest. I noticed this expansive sound and just general "openness" throughout many movies and Atmos-encoded programs I watched.

Occasionally when something was starting or when changing sources there would be a brief single burst of digital static. I've had numerous other bars connected to this same TV and never experienced that before, but it happened enough times with the Q990D that I felt it was worth mentioning.

CONCLUSION

The Samsung HW-Q990D soundbar offers a ton to love about it, in a simple-to-install package delivering performance that would have been unfathomable for a soundbar even a few years ago. Usually, when I'm reviewing a soundbar, I wish I was out in my main room listening to my reference system (a 7.3.6 Trinnov rig), but the Q990D never left me feeling wanting and did everything you would expect an immersive Atmos experience to deliver.

With the addition of 4K/120 Hz support and the new listening modes, Samsung has evolved an already great product into an even better one. While there is still some room for improving the ergonomics and adding some test tones and room correction, the Samsung QN-Q990D sets the benchmark of what a truly exceptional soundbar should deliver.

The Verdict

The newest version of Samsung's top-of-the-line Atmos soundbar maintains the exceptional sound quality, performance, and style of its predecessor. However, the new model comes with some added features, such as 4K/120 Hz HDMI support, making it an even more capable product. It's an effortless recommendation for anyone seeking a high-performance soundbar solution.

GOLDENEAR T66 TOWER SPEAKER

Performance Evolved

RATING

PERFORMANCE ★★★★★

BUILD QUALITY ★★★★★

VALUE ★★★★½

By Mark Henninger

GOLDENEAR'S NEW T66 tower speaker offers audiophiles and home theater enthusiasts high performance in a slender and stylish design. It is a speaker that takes what is already great about the brand and elevates it to a higher level of fit and finish.

The curious thing about these towers is that I feel like I've come full circle in an audiophile journey. It was 34 years ago that I put together my first high-end audio system. My speakers then were a pair of Image Concept 200s from API (Audio Products International), a now-defunct group from Canada that also included the Mirage and Energy brands.

My personal proclivities drew me to the Concept 200s because it was a D'Appolito array focused on a high-performance tweeter that was situated in a large, low-tuned ported enclosure. But I wanted even more than what they offered, so I placed each speaker on top of a Bowers & Wilkins AcoustiTune passive subwoofer. I then connected each "stack" to its own Sony TA-N77ES amplifier operating in monoblock mode. The result? 500 Wpc, extension into the 20 Hz range, and exceptional imaging. It's a combination I have sought in my speakers ever since.

Interestingly, 1990 is the same year that Definitive Technology was founded, and Definitive Technology is well known for putting active subs in tower speakers. It is hardly a coincidence that Definitive Technology was co-founded by Sandy Gross, who previously co-founded Polk. He also founded GoldenEar, where, since its inception, the focus has been on speakers that leverage a D'Appolito MTM (midrange, tweeter, midrange) array featuring an AMT (air motion transformer) tweeter. It's a combination that offers highly detailed, cohesive sound. The T66 speaker renders exquisite levels of detail in the mids and highs but also plays clean, deep, tangible bass into the 20 Hz range.

So here I am, with the latest evolution of this concept, of a D'Appolito MTM driver array perched atop a subwoofer and wrapped up in a slender tower speaker form factor, one that takes up no more space than the speaker itself and operates as a single system.

FEATURES AND SPECIFICATIONS

The T66 is the first model in the new T series and features AudioQuest internal wiring. It follows the classic GoldenEar MTM design, which places an

AMT tweeter between a pair of mid/bass drivers in a D'Appolito array, with felt surrounding the tweeter. Still, it also incorporates a powered subwoofer module in the cabinet.

The active subwoofer feature allows listeners to tune bass output to the room (thus compensating for room gain) and to tweak bass response to taste. Despite being such a narrow speaker, it also makes a frequency response of 29 Hz-25 kHz possible. And that narrowness doesn't just look cool; it also minimizes the surface area of the front baffle.

To maintain that narrow profile, the powered subwoofer section's drivers are front-firing and have a "racetrack" design: ovals with straight sides. This approach allows the speaker to squeeze more driver surface area into the narrow front baffle profile.

Thanks to their opposing alignment, side-firing passive radiators exhibit force-canceling qualities while enhancing the bass output in a manner similar to a ported cabinet but without any chance of audible turbulence.

One prominent feature of this speaker has nothing to do with specifications. It's industrial design. Gone is the GoldenEar "sock," which in legacy Triton models is a single black cloth that covers the entire speaker. This all-black monolith loom is highly appropriate for dedicated home theater. Still, the T66 elaborates on the aesthetic introduced with the flagship Triton Reference and Triton One.R, with glossy paint and a full-length metal grille. GoldenEar's latest ups the ante even further design-wise and is far more appealing in appearance when seen in a living room environment than any GoldenEar speaker before it.

The T66 speakers have an exquisitely glossy paint job. The review units came in Santa Barbara Red, which costs $150 more per speaker than the gloss black. The grilles are partly see-through black metal mesh, allowing you to glimpse the drivers: the D'Appolito array layout and the felt surrounding the tweeter.

At a Glance

- \+ Exquisite detail rendering
- \+ Cohesive soundstage projection
- \+ Deep bass extension
- \+ Elegant aesthetic design
- − Pricey investment
- − Grille not removable
- − Requires power cord and speaker cable connection

Price: $3600/each

www.goldenear.com

SETUP

I tested the T66 towers in two different configurations. One was part of a 4.1 system, with a pair of GoldenEar Triton 7 towers serving as surrounds. These speakers were connected to electronics consisting of a Marantz AV10 pre/pro and AMP 10 amplifier, a potent combo providing processing and power.

The other configuration is a pure two-channel 2.0 system that's as minimalist yet high-fidelity as possible. Here, a Technics SU-GX70 integrated networked amplifier served as the source and provided the power.

AudioQuest sent some of its premium cabling with the speakers. I'm not a judge of the impact cables have on sound, but the NRG-Z3 AC power cables and Rocket 33 speaker cables are an aesthetic and build quality match to the speakers and performed their respective jobs flawlessly.

I used the AudioQuest speaker cable with the Technics setup. They are designed to bi-wire the speakers, with a single pair of leads going to the amp and dual leads on the speaker side. I used 14-gauge, in-wall-rated speaker cables for the Marantz system located on the side of the room.

The Marantz AMP 10 offers integrated bi-amping capability and 400W output into 4 ohms. GoldenEar recommends up to 500W of amplification, so based on specs it is a good match.

The biggest difference between the two-channel and surround-sound approaches is that with the Marantz, the focus is home theater versus music and on integrating a dedicated sub. I used room correction with EQ, namely Audyssey MultEQ XT32, along with the MultEQ-X PC software. Playing along with the speakers is an unreleased prototype dual-opposed 12" subwoofer.

When using the Technics, I treated the system as a purely two-channel, 2.0 setup, albeit one that has HDMI ARC connectivity, so TV, movies, and games are still in the mix.

TWO CHANNELS

Let's talk about the Technics two-channel system first. If you go this route, there are multiple benefits to each T66 having an adjustable active subwoofer. First, add 1,000W RMS amplification to the mix. Last I checked, there's significant value in that alone.

Granted, adjusting the bass levels to match the room is obvious. But less obvious is that by taking away the need to have the outboard amplifier power the deepest bass that the speaker can reproduce, it leaves more power for the rest of the audio spectrum. The result is the modest output of the Technics—60Wpc into 4 ohms—is more than enough to turn high-volume level listening sessions into visceral experiences. You don't run out of steam like you would if the amp had to do it all.

Technics does have its own speaker-optimizing capability that matches the amp to the impedance of the speakers. But that's not room correction, and for purists, tuning the bass with the gain controls on the speakers yields an excellent result while introducing no additional processing or EQ to the signal chain. Once you find that balance for the bass—which does not require moving the speakers, unlike with purely passive designs—the overall sound achieved with a pure 2.0 stereo leaves nothing on the table. For the same money spent, I'd easily opt for this speaker pair over a lesser surround-sound system for the same money spent.

This system, in its two-channel purity and impressive audio fidelity, truly reminded me of what got me hooked on hi-fi to begin with, and it's not how many speakers you can stuff in a dark room. It's how amazing a great pair of speakers can sound in your living room that I care about most.

While I wish I had a Technics to play with, my record collection is way too small to justify that. What I do have is a Fluance RT81P, an entry-level, affordable record spinner that comes with an Audio Technica VM95E cartridge, a classic bang-for-the-buck option. It's not the focus of the review.

Most of my music streams in CD quality (or higher) through

GOLDENEAR T66 TOWER SPEAKER

Roon and a Tidal subscription. With the Technics I enjoyed settling in for deep listening sessions where I played an entire album and listened from the sweet spot, taking in the totality of the mix on any given track. It reminded me of what inspired me to buy that original hi-fi system 34 years ago.

SURROUND SOUND

With the Marantz, the goal is to use room correction to create a cohesive surround-sound envelope (Atmos notwithstanding). I do have Atmos speakers hung, although they are not GoldenEar so I did not include them in the evaluation, although I did use them casually. As usual with Atmos, your mileage may vary depending on the mix.

A 4.1 system (with a phantom center) is the minimum channel count you'd want for proper cinematic surround-sound audio immersion. What I will say is the Triton 7 towers used as surrounds paired extremely well with the T66 towers—as you might expect given their shared lineage. The result is not sound that gives the impression of bouncing between four speakers. Instead, it sounds like total seamless immersion within a 360-degree audio bubble. I did not even miss Atmos height effects because the illusion of immersion is so seamless. The credit goes to how all the speakers work together to render a holographic soundstage and imaging. In a living room setting, on my IKEA sofa, four GoldenEar speakers with T66 towers up front are all you need for total audio immersion.

After running Audyssey via MultEQ-X I looked at the results. I can clearly see it meets its 29 Hz bass specification. Extension down to the mid-20 Hz region is consistently visible in all the measurement locations. But what's really impressive is the linearity of the rest of the frequency range. This is not the typical roller coaster graph I often see. It is refined, a smooth slight downward slope that's absolutely textbook what you want to see in a well-tuned response. There's truly no reason to apply EQ or correction above the Schroeder/transition frequency when the response is already this good in-room.

MUSIC

Music makes the strongest argument for taking one's entire budget for speakers and spending it on just a single pair. The truth is that good stereo imaging is like having an almost infinite number of speakers, it can create sound fields that fully envelope you, and appear to expand beyond the confines of the listening space. And then there's the feeling of a tight and cohesive two-channel musical presentation playing through powerful speakers that don't succumb to dynamic compression. These are costly qualities but the reward is realism, the sense of the speakers disappearing and of the holographic soundstage giving each sound size, shape, and texture.

These qualities led me to listen to a "greatest hits'' compilation of music via Tidal and Roon, using the Technics. Music that in my humble opinion sounds awesome on excellent stereo systems, starting with Love and Rockets and their excellent sounding, critically acclaimed—but poorly received by fans—stab at ambient techno, *Hot Trip to Heaven*. I find it sounds amazing to this day, especially so with the T66 towers teasing out the most tender details typically hidden deep within the recesses of the mix.

While it is definitely not for everyone, Skinny Puppy's *Last Rights* is one hell of an industrial album. The sonic textures on display are an unparalleled journey into beauty and chaos. It is decidedly not a commercial recording, so you get the impact of the high dynamic range (minimal dynamic compression) that's missing from modern recordings. Some tracks are quite beautiful, blending distorted guitar and synth pads, drums, and vocals in a potent swirl of angst and anger like "Killing Game" or outright epic instrumentalism like the psychedelic "Riverz End" where I was mesmerized by the drumming.

Emboldened by how well the GoldenEars handle music, I queued up the remastered version of "Further Back and Faster" by Coil from the album *Love's Secret Domain*. I don't know how a track can still sound fresh after over 30 years and hundreds of listens but this one does it! The build-up teasing you... stretching out the anticipation and then that drop... boom, the Didgeridoo starts playing, the beat kicks in, the sounds start flying around the room, and I remember why two-channel listening is so frikkin' cool. With the best speakers, a great track will blow your mind in no time flat.

But I also know that Snoop Dogg's album, the funk-flavored *Bush,* sounded great, and if Fluance is the weak link here, at least it did not break the chain. *Bush* is a bass heavy but sparkling clean production by Pharrel WIlliams, and even has a Stevie Wonder cameo on the first track, "California Roll." It came through smooth and clear.

When I say there's such a thing as good rap music and am asked for an example, I often mention The Roots

Specs

One Reference high-velocity folded ribbon AMT Tweeter
Two 4.5" mid/bass drivers
Two 5" x 9" Long-throw subwoofers
Two 8" x 12" passive radiators
SENSITIVITY: 91 dB 1W/1M @ 4Ω
FREQUENCY RESPONSE: 29 Hz–25 kHz typical (-6 dB on axis @ 29 Hz, anechoic bass response)
NOMINAL IMPEDANCE: 4Ω
RECOMMENDED AMPLIFICATION: 20 - 500 Wpc
BUILT-IN SUBWOOFER POWER AMPLIFICATION: 1,000W peak/500W RMS, DSP-Controlled

DIMENSIONS

TOWER: 7.5" W x 14.75" D x 48.8" H (with base, no spikes)
BASE: 11.8" W x 17" D
WEIGHT: 60 lbs.

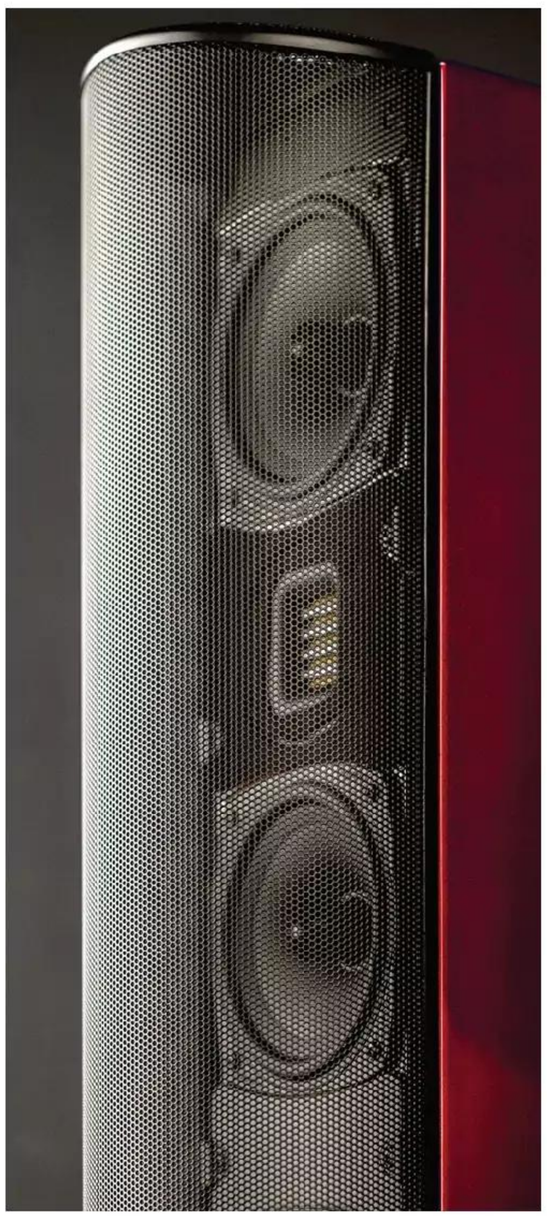
and quickly find agreement. The Roots are in fact a band, and their recordings, while clearly hip-hop, are also recordings of real instruments played by real musicians, with excellent production qualities. This is true for *Rising Down*, the eighth studio album by the band (produced by Questlove), which I listened to on vinyl through the Fluance. I found myself marveling at the fidelity achieved by such an affordable record player. Drums with feelable impact, and crystal clear "in the room with you" raps from all the guest vocalists.

Another rap group I love that played its own instruments is the Beastie Boys, and I'd be remiss were I to miss a chance to play *Hello Nasty* on vinyl. It's loud and crunchy and shows that the T66 towers will not enforce some sort of artificial "politeness" to the proceedings. If brash is what's called for, brash is what you get.

MOVIES AND VIDEO GAMES

While it's sort of unsurprising that the charms of two-channel listening remain strong, I am surprised to find that I have become a contrarian when it comes to expansive multichannel surround sound. And it's certainly not for lack of exposure to highly competent systems I've heard at various demos or the rather extreme Atmos-capable rigs I've had in my own home.

It's just that every time the equation turns to "spend the budget on more channels versus fewer, better channels" what's achievable by focusing a budget on the most important channels in the system keeps slapping me in the face and saying "wake up!" The point of diminishing returns for ever-higher channel counts comes on a lot faster than it does when upgrading speakers in a fixed, modest number of channels. And the savings don't just come from buying fewer speakers, it costs a lot more to buy an AVR or processor that does 11.4.4 channels than a unit with a more modest channel count. But, in my view, that's more money that can



instead go into great-sounding speakers, like the T66 towers.

I find a phantom center preferable to a dedicated center channel for a TV in a living room setup. The reason for that is the center channel always has to go beneath the TV or maybe above the TV. Neither of these locations is ideal and they visually detract from the aesthetic of two stylish tower speakers. Not that I am in any way opposed to center channel speakers, but if the focus is on home theater, by all means, use one. Plus if you go with a two-channel solution like the Technics, there's no center channel option to begin with.

With a phantom center and the T66 towers imaging so well, dialogue appears to come from the middle of the screen, right where it's supposed to. The catch is that not all speakers can pull off this trick. In fact, I've found it to be a relatively rare quality, but one I seek out and note when it does happen.

I watched several movies during the review, including *Napoleon, Oppenheimer, American Fiction*, half of *The Marvels*, and a rewatch of *Aliens*, which I know by heart. What I noticed, is what I did not notice. When watching the movies, I totally forgot what sort of system I was listening to. Each and every time! With just 4.1 channels, the sound was seamless and correct to the point where with the lights out and a movie playing, everything was "just right" and you don't question it. And that, by the way, is the elusive "suspension of disbelief" and "immersion" you read about all the time. It's as simple as that!

OVERALL PERFORMANCE

Given the GoldenEar design heritage and AudioQuest explicitly building upon an already successful lineage, it is no surprise that the T66 towers perform at a very high level.

Perceptually, they offer incredible imaging and soundstaging. Objectively, the measurements exhibit excellent linearity and extension in the in-room response. In its marketing, GoldenEar emphasizes the excellent soundstage and imaging capabilities of its speakers. This is not mere marketing spin. It was clearly observable every second I listen to this pair of speakers in my living room. It's a quality that has defined my experience with the brand, ever since I first heard a pair of Triton towers over a decade ago. Bottom line, I like the sort of speaker that GoldenEar is known for.

I find its most impressive quality is the stability of the soundstage. You get a proper floating stereo image, even if you're not seated in the exact sweet spot. It does not collapse when you are off-axis, and its ability to project a holographic image over the seating area of a typical sofa makes staying with a phantom center channel an appealing option.

The big surprise is how irrelevant I found room correction and multichannel surround. When it comes to performance, the simple 2.0 system with the Technics in charge has just about everything I ever look for in an audio system.

CONCLUSION

These new GoldenEar T66 speakers are a major upgrade to the offerings of an already great brand. Aesthetically and performance-wise, they significantly raise the performance and aesthetics bar. Although seemingly premium priced, with the subwoofer integration, they deliver a lot of value for a speaker at their price point.

The key is that thanks to GoldenEar's extensive lineup of center channel, surround speaker, and subwoofer options, you can start with a pair of T66 towers and build out as elaborate a surround-sound system as you'd like. Or instead, thanks to their quality, you can keep it simple and get exceptional performance out of a purely two-channel system. One that costs four figures, but sounds like it costs five figures.

In other words, these are not merely excellent audiophile speakers. They are not simply awesome home theater speakers. To my ears and to my eyes, GoldenEar's T66 towers are nothing less than an audiophile masterpiece.

The Verdict

The T66 offers audiophile-grade soundstage and aesthetics. With exceptional detail, powerful bass, and sleek design, these GoldenEar speakers are an outstanding investment in high fidelity.

ARCAM A25 INTEGRATED AMP, ARCAM ST5 STREAMING PLAYER

Dynamic Duo

By Leslie Shapiro

RATING

PERFORMANCE ★★★★★

FEATURES ★★★★½

ERGONOMICS ★★★★½

VALUE ★★★★★

COME ON and admit it. Most of the time, when you stream your favorite playlist from Spotify or Tidal, you just toss it to the nearest little Bluetooth speaker you have. Or heaven forbid, just listen to it on your phone. Oh, the humanity.

While getting access to infinitely massive libraries of streaming music has become amazingly easy, listening to that music on a high-quality system still seems to be elusive. However, pairing the new Arcam A25 integrated amplifier with the also-new Arcam ST5 streaming media receiver makes it effortless to get your music from the cloud out to your oft-neglected stereo speakers. Remember those things? You know, those gorgeous tall beauties sitting quietly and anxiously waiting to be adored in the corners of your listening room. Get them ready because good things are about to happen.

British manufacturer Arcam is known for elegantly simple, high-quality audio products, most notably the A60 amplifier, released in 1976. Just over a decade later, Arcam released the Delta Black Box DAC, the world's first stand-alone DAC to work in conjunction with their CD player. In 2016, Arcam launched the Solo Music line, which is currently available as an integrated streamer and amplifier. Today, Arcam has the Radia product line. This includes both the A25 amplifier and the ST5 high-resolution streamer designed to work seamlessly and effortlessly together or apart.

The Radia line follows the stated tenets of Arcam: amazing sound with an inspired British heritage, bringing luxury within reach. I was excited to hear for myself how well these two products lived up to the hype.

The Radia products, while not even close to budget priced, are investable equipment priced to be affordable to a younger audience. You could call it aspirational audio. I call it a fantastic way to draw any audience into a quality audio experience. The A25 costs $1,499, and the ST5 is $799.

All of the newly released Radia products have a beautiful modern industrial chic design aesthetic that begs to be left out in the open instead of hidden away in a gear closet. And as always, amplifiers should have plenty of space for airflow around them. All Radia products use a bold radium yellow accent, but in the most subtle way.

Both of these products share a similar design: Anodized black aluminum frames smoothly wrap from each side and over the top in a single, solid piece, with a subtle yellow racing stripe along each side. The top plate extends over the back, shielding and protecting the cable connections on the back. This is a plus and a minus. While it does protect the cable connections, especially if any component is accidentally pushed back into a cabinet or shelf, it shades the labels on the back which made one-time setup a little more difficult than it had to be..A handy flashlight app took care of that, but it was a bit of a hassle, especially for plugging in a directional TOSLINK connector or double-checking the control cable connection.

I really appreciate that both components are packaged in plastic-free boxes, made of all natural materials. My Roomba and I are especially thrilled that my media room floor isn't currently covered in tiny bits of styrofoam balls.

Experience seamless integration with the Arcam A25 and ST5 duo. These elegant companions bring your music to life, connecting you effortlessly to vast streaming libraries with a powerful 100 Wpc amplifier.

While the A25 amplifier and the ST5 streamer are designed to work flawlessly together, each one stands alone and can work in a variety of setups and situations. As such, I would like to talk about each product individually before focusing on how well they work in conjunction with each other.

ARCAM A25

The Arcam A25 features a 5th generation Class G amplifier. This technology is known for its low power amplification at lower volumes, then kicking into a higher power supply if needed. This allows the A25 to run cooler, as less heat is generated. That means a lighter, smaller heatsink can be used. The A25 weighs in at just under 20 lbs., which is quite light for a 100-watt per channel amplifier. The A25 measures, with its rubber feet, 17" x 3.27" x 13.5" (w x h x d). Even with this cooler-running efficiency, the ST5 should not be placed directly on top of the A25, and the A25 shouldn't be placed in a closed cabinet where it could have the potential to overheat.

The front panel is wonderfully simple. In the middle of the panel is a very simple, almost retro style dot-matrix LCD display panel behind a matte glass panel that indicates input selection, bitrate, and output volume. There is one knob on each side of the panel, both with illuminated radium yellow backlighting, one for input selection and the other for volume. The input knob can be momentarily pushed to select an input or pushed and held to rename an input. The volume knob can also be pushed to mute or unmute the system, or pushed and held to put the unit in standby mode.

The only connection on the front panel is for the headphone output, unlabeled on the lower left corner of the front panel. The A25 has wired and wireless headphones. The Bluetooth connection features 24-bit aptX Adaptive technology, keeping with the high sonic quality of the amplifier. Besides having Bluetooth as a source, you can output the A25 to Bluetooth speakers.

All other connections for the A25 are on the back panel. I hate to be such an audio freak, but I just love the hefty, solid feel and sexy look of the crystal-shelled WBT-type 5-way binding post speaker connections. There. I said it. One thing to note is that, given the overhang of the top plate shielding the back panel connections, it is hard to see and read the lightly stenciled labels. From left to right on the back panel is the power cord input underneath a hard-wired power switch. There is a small toggle-switch panel to select the supply voltage from 120V to 240V. There is a service port, next to what looks like a telephone cord jack (does anyone remember those?) that runs a supplied cable between this unit and other Arcam Radia series components as an integrated controller. Next to that are an IR input and trigger inputs and outputs.

The A25 has an impressive array of audio inputs. There are two digital coaxial RCA inputs, one optical TOSLINK connection for 192kHz/24-bit audio, and a DSD USB-C input that handles up to 384kHz/32-bit audio. There are three RCA analog (Arcam is a British company, so it actually says "analogue") inputs and a phono (MM) input, along with a preamp out. Although it lacks bass management, this output can be used for a subwoofer.

The remote control also features the signature radium yellow, this time on the volume up/down controls. It should be noted that the A25 and ST5 come with almost identical remotes – they are only differentiated by the product name stenciled on the bottom. Luckily, once the connecting control cable is installed, only one remote is needed. The slim matte-black remote has a power button and a menu navigation circle with a central button to make selections.

Surrounding the yellow volume control are the following buttons: settings menu, audio output selection, transport buttons, display brightness, and audio mute. The menu brings up critical adjustable parameters such as audio output (speaker or BT headphones), balance, and DAC filter options. All other features are controlled via the Arcam Radia app, which is essential to use with the ST5.

At a Glance

- \+ Gorgeous matched components
- \+ Streamlined integration
- \+ Excellent sound quality
- − Identical remotes
- − App lacks direct access to Tidal/Spotify
- − Defaults to analog output

Price:

Arcam A25: $1499

Arcam ST5: $799

www.arcam.co.uk

ARCAM ST5

The ST5 streaming digital media player is the ideal partner for the A25. The ST5 is designed to be a single player for all types of digital sources. It can be connected via Wi-Fi or Ethernet to use Apple AirPlay 2 or Google Chromecast. It will be a direct playback source for both Spotify Connect and Tidal Connect, and the ST5 is a certified Roon Ready device. Even more sources are available through the Arcam Radia app; these include Internet radio, podcasts, UPnP and connected USB media, and the Amazon music library.

Designed to match and

ARCAM A25 INTEGRATED AMP, ARCAM ST5 STREAMING PLAYER

complement the A25, the ST5 has the same single sheet of matte black aluminum wrapped around the sides and over the top of the unit. The same overhanging metal extends out over the top of the back panel connections, and it also sports the yellow racing stripe on the sides.

The front panel simply has the same dot-matrix LCD display with no other buttons or knobs. That's it. Elegantly sparse. Arcam has stated that by eliminating a fancier OLED display, both the A25 and the ST5 can eliminate an additional microprocessor. Simple is usually better. The back panel has a power cord input next to a hard-wired power switch. There is a USB service port, next to the control cable jack that connects this unit to other Arcam Radia series components, so only one remote is necessary. There is an Ethernet jack and a USB media input. Next to that is an IR input and trigger output. Finally, there is an optical TOSLINK output, a digital coax RCA output, and a pair of analog audio RCA outputs.

The remote control for the ST5 is needed to set up some features that aren't mirrored on the app. The digital filters and output type are selected here: Analogue, Digi Core or Bitstream. Digi Core should be used for the streamer to do the MQA decoding, and it's also necessary when using the control cable (more on that below.) Bitstream moves the decoding to the DAC in the A25. Volume control is also set here: Fixed, Variable, or External.

SETUP

I am pleased to report that from cutting open the taped cardboard shipping boxes to getting audio to play and sitting back to enjoy it took less than 30 minutes. These days, with apps and updates, I think that is quite impressive. As recommended, I put the A25 on top of the ST5 to allow maximum airflow, but even after a solid hour of listening at robust levels, the top of the A25 was just warm, not hot. I downloaded the Arcam Radia app for Android and was pleased at how easy it was to get going. (Other, palindrome audio company that also does a lot of streaming audio, I'm looking at you and your app...)

The A25 powered right up and was ready to rock immediately. The ST5 needed to be connected to my home Wi-Fi, and the app made this so very painless. It found and connected instantly, but needed to run an update. No problems there, and a prompt five minutes later it was up and running. I also opened my Google Home app and set up the ST5 as a Chromecast device. I'm not even sure this is necessary, because it connects directly to the only music sources I regularly use, Spotify Premium and Tidal.

When I open those apps directly, the ST5 shows up both as a direct connection and as a connection through Chromecast. I have to mention again how painless this whole setup process was. As more and more products become mainly app-driven, they need to be easy to operate. Throughout my audition process, the app was always responsive and instantly found the ST5, unlike other ecosystems that routinely lose track of my connected speakers.

I connected the A25 to my floorstanding Polk RT800i tower speakers, wired traditionally with the jumper straps in place. Initially, I connected the ST5 to the A25 using the analog RCA outputs, because I wasn't getting audio from the TOSLINK connection. A glance at the online owner's manual, I discovered that the digital outputs are disabled by factory default, and the output type needs to be set to digital in the settings menu. This isn't mentioned in the quick-start guide included in the shipping package. Note to self: always read the manual, even when it seems intuitive.

I also connected the control cable. This would eliminate the need for using two separate remotes, which is especially essential since the two remotes are so hard to differentiate from each other. When connected digitally, the ST5 doesn't have a volume control, but its remote is still needed for track controls, so it's worth it to go through the manual and step through setting up the control cable option. The ST5 remote was able to control everything after connecting. Honestly, everything is easier to control from the app, so once all the settings were defined properly, I put the remotes away and just used the Arcam Radia app moving forward.

I also connected a USB thumb drive that is loaded with a huge variety of music types and file formats. Navigating folders in the app was easy and straightforward. I appreciated that the display on the A25 indicated the bitrate of the music files, which ranged from MP3 to 44.1 kHz WAV files. The ST5 supports up to 24-bit/96 kHz AAC, 24-bit/192 kHz AIFF, 24-bit/192 kHz ALAC, 24-bit/192 kHz FLAC, 16-bit/48 kHz MP3, 16-bit/48 kHz OGG, 24-bit/192 kHz WAV, and 16-bit/48 kHz WMA files.

PERFORMANCE

What can you say about a seemingly transparent amplifier and streaming media player? The A25 added no coloration to my Polk RT800i speakers. I also tried Bluetooth output on my Mark Levinson No. 5909 headphones. Running through as many options as I could, I also used the No. 5909 with their wired connection through the 3.5mm output on the front of the A25.

When connected digitally, there is just a single volume control displayed on the A25; when using the analog connection from the ST5, each device has independent volume controls. As such, it was possible to overload the inputs to

Specs

ARCAM A25 INTEGRATED AMPLIFIER

- 100W/8Ω, 165W/4Ω for dynamic, room-filling sound.
- Near-zero distortion (0.002%) for true-to-life audio fidelity.
- Three RCA pairs for multiple analog sources.
- MM phono input for turntable enthusiasts.
- USB-C, Coaxial, Optical inputs support up to 384kHz and DSD 1024.

HEADPHONE FRIENDLY: Robust output (up to 5V) for a broad range of headphones.

- Compact (17" x 13.5" x 3.3") and lightweight (19.84 lbs).

ENERGY-EFFICIENT: <0.5W standby power consumption.

- Includes all necessary accessories for immediate setup.

ARCAM ST5

HI-RES SUPPORT: FLAC, WAS (LPCM), MQA, AAC, ALAC, AIFF, DSD (128) for audiophiles.

- Hi-res at 16, 24 bit; 44.1, 48, 88.2, 96, 176.4, 192 kHz ensuring compatibility with most high-definition audio files.
- Plays MP3, MP4, OGG, WMA at 16 bit; 44.1, 48 kHz, covering all common audio formats.

GAPLESS PLAYBACK: Yes

OUTPUTS: Digital - 1x Coaxial (RCA), 1x Optical (Toslink); Analogue - 1x Stereo (RCA) pair.

FREQUENCY RESPONSE: 20Hz—20kHz ± 0.05dB

POWER SPECS: 100V, 110–120V, 220–240V, 50–60Hz; Consumption - 12W; Eco standby - <0.5W.

- Compact at approximately 17" x 13.5" x 2.24" (W x D x H) and lightweight at 7.72 lbs.
- Included Accessories: Mains leads, remote control with batteries, control cable, quick start guide, safety instructions.

the A25 by maxing out the volume from the ST5 while the volume on the A25 was low. The slight distortion vanishes after balancing the gain between these units, and using the TOSLINK or digital coax connection completely eliminates it. I found no reason to use the analog connection, especially considering the ST5 uses a high-quality ESS ES9018K2M high-resolution DAC. This same DAC is used in the A25.

I prefer to stream Tidal, especially for sound quality evaluations. I queued up Norah Jones' latest release, "Staring at the Wall", a delightful collaboration with Leon Michels. The ST5 and A25 captured every nuance of this upbeat and insanely catchy song. Jones's tripled vocals with lead and harmony were distinct, and even the slightly detuned piano was conveyed transparently. The overall mix has a raw, garage-studio quality, and all of the imperfections of the performance are captured.

Mark Knopfler's songs are often used as reference tracks, and his latest, "Watch Me Gone" is no exception. The A25 and ST5 conveyed his instantly recognizable voice and guitar flawlessly. The air and space around his guitar were clean, and honestly, they made me fall in love even more with my trusty old Polk speakers. I am so glad to have such an easy way to get new streaming music options into my favorite speakers without sacrificing convenience or quality.

Both Tidal and Spotify are accessed directly through each individual app. I really would have liked to see links to them within the Arcam Radia app. Other companies (looking at you, Sonos) can do this, so I was a bit disappointed that I had to leave the app to find them. However, the app does give access to a variety of media options.

The Arcam Radia app has six user-selectable presets, or you can search through Internet radio stations, with a separate category for high-quality stations and genres. There is another button that brings up podcasts, and another opens Amazon Music. From there, I could search my Amazon account for suggested playlists and stations, access my playlists, and find my purchased Amazon music selections. There's a button to access music stored on a UPnP device on the same Wi-Fi network, a Qobuz button, and if a USB drive is plugged into the back panel, the USB tab is shown.

Very limited settings are available in the app. Mainly device name, updates, software versions, and a factory reset. Please remember that the digital output is off in factory default mode, and if reset, that will need to be re-enabled.

As mentioned above, I had to open Tidal Connect and Spotify Connect within their own apps to stream them. Both have gapless playback. Interestingly, because I had set up Google Chromecast with the ST5, I was given the option to connect directly to the streamer or connect through Chromecast to the streamer. I auditioned both quite carefully and could not discern any appreciable difference between connection pathways.

CONCLUSION

All in all, I wish I could access everything from everywhere all at once through the app. A smoother experience would be appreciated if I could access all settings from the app instead of stepping through the somewhat cumbersome on-unit setting menus. It would have been so much more intuitive to see Tidal Connect and Spotify Connect on the source selection menu in the app, even if those tabs just sent me to those apps. It would have made for a more seamless and streamlined experience if everything was contained within the app.

The faults I had with the combination of the A25 and ST5 are easily overcome. The slight bit of distortion is simply a gain imbalance that is corrected by adjusting the gain of both units properly. The issue I have with the remotes looking so similar is eliminated by properly setting up the control cable and menus to allow the use of just one. Even better, just use the very well-designed app for everything.

While I would have liked to have links within the Arcam Radia app for Tidal and Spotify, it's not a big deal to access the ST5 from the music streaming apps, which in turn makes it easier to navigate tracks and playlists. There is one tiny other issue. You might ask why I keep using the full name of the Arcam Radia app throughout this review. It's because on my Android phone, the app is under "R" for "Radia", and I really keep wanting it to be under the A's for Arcam.

The sound quality of this dynamic duo is absolutely transparent. I could discern no appreciable artifacts or coloration. When I listened to lower bit-rate MP3 files, their inherent sonic issues were audible. The combination of components did nothing to mask the MP3 coding artifacts, but they certainly didn't add anything detrimental. Higher-resolution file formats and higher-resolution streaming content were consistently clean. If anything, I fell in love with my Polk RT800i speakers all over again.

And that might just be the whole point of these products. Combining the A25 and ST5 with an existing high-fidelity speaker pair brings you back to everything you love about listening to music. It's gotten so easy to just connect a phone to a crappy little Bluetooth speaker and call it good. It is not good.

With so many high-resolution streaming services available, you owe it to yourself to listen to a combination of components that bring out the best in music. You and your music deserve better. Dust off those speakers, pull them out of the back recesses of your music listening room, set up the Arcam A25 and ST5, and sit back and enjoy. It's well worth it.

The Verdict

Combining a streaming media player and amplifier eliminates all excuses to use anything else to play music. You can add the speakers you prefer for the music you enjoy with seamless access to Tidal, Spotify, UPnP, and a USB drive powered by a 100 Wpc amplifier. What a winning combination!

OSD NERO AB5 ACTIVE STUDIO MONITOR SPEAKER

Affordable Fidelity

RATING

PERFORMANCE ★★★★½

BUILD QUALITY ★★★★½

VALUE ★★★★★

By Dennis Young

HAVE YOU ever wondered why something good usually costs so much? Of course, we all have.

Outdoor Speaker Depot is little-known, but it is celebrating its 20th anniversary. It is an internet direct site based out of Brea, CA, offering an extensive array of goods at prices that will make your jaw drop. The OSD Nero AB5 is a case in point, utilizing active crossovers, bi-amped Class D amplifiers, digital signal processing, and quality drivers that rise above those typically seen at this price point. That's just scratching the surface.

The Nero AB5 gives us a few inputs: 1/4", XLR, and RCA. Sadly, no Wi-Fi or streaming capability is available, which would increase the cost. Also, it handles subwoofer integration externally. Gain control allows quick level adjustment matching the need, whether for the previously mentioned subwoofer system or for level-matching other inputs from a preamp/receiver or mixing board. High (±1 dB) and Low (±2 dB) frequency

Active crossovers and quality components deliver precise, engaging sound from these compact speakers.

trim switches allow boundary compensation.

A composite 5.25" fiberglass woofer and 1" ferrofluid-cooled soft-dome tweeter move the air. A shallow waveguide helps the tweeter by providing factory-specified 110-degree horizontal and 70-degree vertical pattern control and allowing the electronic crossover between the drivers to dip down a little lower than we typically see at 2 kHz, with DSP aligning the phase. The waveguide also allows for a directivity match between the two drivers at the crossover point. A surprising feature is the 3M® EVA anti-vibration pads that keep the speaker cabinets from chattering on desktops and stands.

Front-mounted bass reflex ports help direct energy away from the front wall, enabling close placement to the wall, with the LF trim switch also facilitating this. The package includes magnetic grilles, but I did not use them. I could hear the cabinet talk when knuckle rap-testing, but the baffle with integrated waveguide rang dead. It is an intelligent, acceptable, and necessary concession to the build price. Weighing in at under 10 lbs., the 7.28" x 11.8" x 9.57" Nero AB 5 fits neatly into the desktop monitor class.

INSTALLATION

HF and LF trims help integrate the Nero AB 5 into a free field or desktop situation. I tried the speakers in two environments: in my living room multimedia system serving as L/R mains and in a built-in alcove desk in the corner of the living room. The desk allowed me to experiment with the bass and treble gain switches, as we will soon see. I had to spend 19 bucks on a double 10-foot run of RCA cables.

It is easy to get a pair of AB5s up and running. You only need a source with a level control and the aforementioned signal cables. I just used my AVR and benefited greatly by using Audyssey XT32 for subwoofer correction. I placed the AB5s on 28" stands and checked the treble and bass "switches" on the back, ensuring they were at 0 dB, and the level control was in the middle. Then I turned everything OFF (always do this when making/breaking connections), unplugged my reference speakers from the wall (they are ESLs), unplugged their stereo amp from the AVR, plugged the speakers into the newly-vacant power receptacles and the AVR, fired everything back up, disabled previous Audyssey settings, and it was go time!

I tried a few songs from *The Essential Billy Squier* compilation, as that was what I was in the mood for, and the recordings are great for calling out treble harshness, as many of his albums have a signature peakiness in the treble. "The Stroke," "Here in the Dark," and "Everybody Wants You" maintained that high-frequency edge, but I wanted a little more output as I was running my AVR at the 0 dB reference level. I ran the level control wide open with plenty of gas left in the AB5's tank.

"Emotions in Motion" showed me that my dual subwoofer system was in lock-step with the monitors, and the combo was immediately ready for an Audyssey massage. I did try a bit of HF attenuation first. Even though it is only supposed to be a 1 dB cut, the shelf EQ is wide enough to be quite audible and deemed, in this setup, to be undesirable to me. This option and the LF trim are best used on a desktop and/or in systems that do not utilize correction software.

Acoustic measurement at the listening position confirmed my initial listening impressions, revealing a V-shaped nature, flat from 55 Hz to 500 Hz, gradually descending to 4 dB at 2 kHz, then gently rising again to level off at 4 kHz. A few 'brilliance' peaks at 6 and 8 kHz give the speaker a 'lively' sound, even when activating the HF trim cut. Bass response was flat down to 55 Hz, starting to roll off steeply, as expected from a bass reflex cabinet.

The soundstage was nice and wide, with sharply focused central images. It soon became apparent that this is one of those speakers that encourages leaning on the volume control; I often turned it up after turning it down to focus my attention elsewhere while working. It is one of those speakers that will steal your attention! This $100/each job isn't messing around; it is completely serious. The upper mids/lower treble did tend to grate a bit when pushed to the limit at higher volume levels, reminding us that we are listening to a small monitor.

Turning the subwoofers off, I listened to a little Black Sabbath. They held a really good account of themselves. I kicked up the LF bass boost Trim on "Master of Reality (2014 Remaster)" and found it to be a bit clumsy. Turning it back to neutral made everything more 'real', "mastering" the universe that is my room.

At a Glance

- \+ Best speaker of any size, shape, or configuration I've ever heard for the money
- \+ Small, easy to place, and affordable
- − Needs wall power and a wired signal

Price: $99.99/each

osdaudio.com

888.779.4968

I have a few decades of sat/sub setup experience, and my Room EQ Wizard (REW) Room Calculator helped streamline the process significantly and can help one save weeks/months/years of physical experimentation. This dual subwoofer setup works well in my room for all the speakers they have supported, and I welcomed the Nero AB5 pair into the system. I used Audyssey for the subs only, with the crossover set at a lowish 60 Hz to fully wring out the OSDs. Also, it just sounded best this way.

LISTENING IMPRESSIONS

From *The Essential Kenny Loggins*, "This Is It", I noticed that the highs got a bit brash when the OSD is pushed, a quality that I found across the board with all sources, but good ol' 80's pop recording tech accentuates it, over=accentuating Loggins' "breathy" vocal qualities. The accompanying background vocals from the likes of Michael McDonald carried the same slightly strident quality but the Nero AB5 presented it in a way that was not objectionable.

Henry Mancini's "The Pink Panther" (Original Motion Picture Soundtrack) kicks off with the famous saxophone sound anchored dead center, about the size of a basketball, with the accompanying instruments spread over various points on the soundstage, some as small as a

OSD NERO AB5 ACTIVE STUDIO MONITOR SPEAKER

tennis ball, the bass filling out the entire space. Pinpoint instrument/vocal location should be apparent when listening to well-recorded tracks, and the AB5 did not disappoint.

Black Sabbath Vol. 4 "Supernaut" (2014 Remaster) is another imaging case in point, with Bill Ward's hi-hat starting off the song, panned ridiculously hard left as we often find in recorded music. As the track progresses to the 12-second mark, Ward starts using the rest of his kit, and we find that he is now sitting in the center, toward the back rather than the front left. As a multi-instrumentalist, drums included, I'll never understand why studio engineers do that.

The Nero AB5's exceptional imaging properties drew this acoustic cartoon as intended.

Jefferson Starship's "We Built This City." I absolutely hate this song with a capital H, and I have not heard it in a while, entirely on purpose. This is the first time I did not shut it off, listening through the entire track instead. I must admit, it sounded pretty good, even though the song itself is quite awful (to me). The wistful and pitifully short 5-second guitar solo at 2:32 captured my waning attention and dragged me back "knee-deep in the hoopla," the song eventually concluding with a background vocal anchored firmly on the right, where it should be. I consider the Nero AB5's ability to get me through that song a success!

Korn's "Make Me Bad" highlights what some call "inner detail"; I call it a clean production noise floor, an attribute that the AB5 calls out when being tasked to reproduce, as it should. Depth and width were reproduced in a satisfactory fashion. In contrast, the following song, "Thoughtless," from the Untouchables album, failed to impress because it sounded like a cluttered, loud mess confined to a small space. The Nero AB5 made it easy to hear the difference.

Delving into Tidal video content, The Alan Parsons Project's "Games People Play" (Official HD Video) kicked booty on the dynamics, which surprised me, considering the presentation seemed like an overblown 3-foot-wide mono recording trying to sound four-foot-wide. Nonetheless, the speaker did its best, allowing me to enjoy audio and video that was far from HD. Good speakers do not make lesser recordings sound worse; quite the opposite.

Madonna's *Celebration* compilation "Vogue" starts out with a serious synth mood that fills most of the space between the speakers, with most of the sound panned slightly left. Percussion and faux-finger snaps join in, images panned outside of the speakers and giving a wonderful

Specs

WOOFER: 5.25" inch composite fiberglass
TWEETER: 1" ferrofluid cooled soft dome
FREQ RESPONSE: 50Hz - 20kHz
Max SPL: 107 dB
HORIZONTAL COVERAGE: 110°
VERTICAL COVERAGE: 70°
INPUT: Input signal (impedance) 5 KΩ
INPUT CONNECTORS: XLR, jack, RCA
INPUT SENSITIVITY: +4/-2 dB
AMPLIFIER TOTAL POWER: 100W
HIGH FREQUENCIES: 25W
LOW FREQUENCIES: 75W
CONNECTION: VDE
CROSSOVER FREQUENCY: 2,000 Hz
SENSITIVITY CONTROL: -∞, - 6 dB, 0 dB
LIMITER: Soft limiter
FREQUENCY CONTROL: HF adjust -1dB,0, +1dB
LF ADJUST: -2dB, 0, +2dB
SOLD AS: Single
DIMENSIONS (W X H X D): 7.28 x 11.8 x 9.57 in.
WEIGHT: 9.25lbs
WARRANY: 2 years

sense of soundstage width. To carry on with that sense of width, Madonna comes in to “Strike a Pose.” to the outside of the right speaker, then on the left.

The drums bring attention to the center stage while Madonna continues to bounce to and fro, left to right before being brought to the fore, now anchored front and center, the accompanying bass lines captivating me enough to start involuntarily rocking my head.

Settling in to watch *Joe Kidd* I was not at all shocked when stereo appeared in my AVR display (the film was made in 1972).I was surprised to discover that the sound was mono! I looked it up and found that the mastering for all releases is in 2.0 Mono. With my subwoofers engaged, the AVR was kind enough to render that as 2.1 Mono, and I could enjoy sound much better than would be found in an early ‘70s cinema. This is thanks to the Nero AB5’s active crossovers, digital signal processing (DSP), supporting subwoofer system, Room EQ Wizard room modeling, and digital room correction (DRC).

I had time to briefly move the Nero AB5s, into a nearfield desk environment. Choosing a less bass-heavy version of a semi-famous bass test track, I gauged the mettle of the Nero AB5 with Bassotronics “Bass I Love You Too”. Gone was any sense of wanting more volume; all you could want to achieve and more was available nearfield. The monitor handled the track surprisingly well, but the lows were a little overblown due to the boundary reinforcement of the front and side walls. This is where I found the trim switches to come in handy and a -2 dB cut on the LF Trim set everything right again.

Listening nearfield in a desktop setup revealed more detail in the higher frequencies, probably due to having a bigger dose of close-up highs beamed directly into the ears. It offers a directness you won't find with speakers that are further away. This is similar to why headphones and in-ear monitors sound balanced—because

the room's acoustics have less impact. I liked keeping the volume moderate and didn't need to engage the HF Trim control.

PERFORMANCE

Active is better. Taking out the worst part of the chain, the passive crossover, seems to be a huge gain. Combine that with attention paid to driver quality and internal DSP correction, and you get noticeably increased performance. Why aren’t more speakers like this? You can certainly spend much more and own worse.

The AB5’s cabinet reflects the overall cost and, as a result, is not built like a brick house. Its highs are not the most refined and definitely cannot be labeled as ‘laid back.” Still, I find this to be a highly revealing monitor for work or play. Its gentle, V-shaped signature is not at all obnoxious. It could use a little more ‘oomph’ at higher SPLs, which is my most minor criticism of this fantastic little monitor.

As an acid test, I was able to crank my AVR with the AB5 level pot also cranked and effectively out of the way. The DSP limiters on the mains and the subs made this a non-issue. There was an edge to the sound, but I still sought more throw on the volume knob and the system, AVR/Mains/Subs, took it in stride without melting down. It was so easy to integrate a few basic components, source, AVR, mains, and subwoofers, to achieve such captivating sound. Running DRC in a well-treated room increased the accuracy and fun, and the OSD AB5 was kind enough to get on board with the improvements.

A pair of AB5s produce the most expansive soundstage I've experienced from a compact monitor. Arranged in a 7-foot equilateral triangle with the listening position, the sound seems to extend about 2 feet beyond the physical edges of the speakers, creating an impressively large image. A remarkable ability to generate precise sound placement was my favorite feature of the Nero AB5. It definitely benefits from bass augmentation; send a subwoofer or four my way next time, OSD!

CONCLUSION

The OSD Nero AB5 offers the highest value return for dollar vs. performance that I have ever experienced. Now, let us not get too excited here. The Nero AB5 is not a world-beater, just a solid performer in its category, dare I say at the top. It’s not the best at anything other than being that, a tremendous value.

Why aren’t more speakers like this? You can certainly spend much more and own worse.

This speaker is a versatile recording tool that happens to lend itself to recreational listening as well. It has a gentle V-shaped response, deviating slightly from the expected norm. Central vocals are called out in stark relief. Solid bass response for its size and a cohesive blend between the tweeter and woofer complete the package.

I can think of several rooms in my home where the OSD Nero AB5 would be a welcom. This is a serious loudspeaker and should be given due consideration.

The Verdict

My ears and wallet give the OSD two big thumbs up.

BLUESOUND PULSE M WIRELESS SPEAKER

Packed with Sound and Features

By Barb Gonzalez

RATING

PERFORMANCE ★★★★½

BUILD QUALITY ★★★★½

ERGONOMICS ★★★★½

VALUE ★★★½☆

EVER SINCE Sonos came out with a multiroom audio solution nearly two decades ago, companies like Bose, Denon (HEOS), and others have followed suit. In 2012, Canada-based Lenbrook Group—which manufactures NAD, PSB Speakers, and Bluesound—first launched its BluOS platform for speakers and devices. It has morphed and developed into BluOS 4, the most uncomplicated controller and aggregator app for wireless speakers.

The elegantly sculpted Pulse M speaker has a contemporary design that fits into any home decor, unlike Bluesound's boxy predecessors. The acoustic fabric on the top half of the speaker gracefully curves down, meeting a matte base. A chic oval glass top conceals capacitive touch controls for volume, skip and repeat, and five preset stations. The surface comes to life as the proximity sensor recognizes a hand hovering over the speaker, and the controls light up. Overall, the 8-inch tall Pulse M is a sleek device that surreptitiously fits into your home decor.

At $399, it's pricier than other wireless Bluetooth speakers but comparable to Sonos and Bose wireless models. Designed for audiophiles and others who want high-resolution music in more than one room, the Pulse M is ideal for those seeking a premium background music experience.

WHAT CAN THE PULSE M DO?

What elevates the Pulse M is its ability to stream and play high-resolution music directly from music services over a home network. Last fall, Lenbrook acquired MQA, so its speakers naturally include Master Quality Authentication decoding for playing MQA high res music from Tidal and other sources.

The Pulse M is equally capable of other high-resolution formats, including WAV, FLAC, and ALAC. Still, these high-resolution formats are limited to WiFi streaming, a wired network to the speaker's Gigabit Ethernet port, or via a USB drive connected to its USB port. The speaker's other wireless streaming options—Bluetooth aptX HD and AirPlay 2—max out at CD-quality.

AirPlay 2 also allows users to create synchronized speaker groups within a room or throughout the home. Or the Pulse M can expand its capabilities using other Bluesound devices. Pair it with a second Pulse M for stereo speakers or integrate it with the Pulse SOUNDBAR+ or POWERNODE and add two more speakers to create a wireless surround sound system with dedicated rear channels.

As if all the wireless ways to connect to the Pulse M weren't enough, the speaker has a USB-A input to connect a hard drive with your downloaded music library, and a 3.5 mm input; a TOSLINK optical to 3.5mm mini adapter is included. Music from a device plugged into the Pulse M's inputs can be shared with the speaker group.

There are many ways to connect to the Pulse M speaker and about as many ways to control the music and playback. The BluOS 4 Controller app is available for iOS, Android, and Kindle Fire; an app for Windows or Mac OS X desktop, and a four-screen app for the Apple Watch.

Music services in the app will stream with the highest audio quality. Streaming services include Amazon Music, Custom Channels, Deezer, Napster, Neil Young Archives, nugs.net, Qobuz, Qsic, Spotify, SoundMachine, Tidal, and Tunify, and a handful of regional offerings. Internet radio support includes Calm Radio, SiriusXM, iHeartRadio, Slacker Radio (now LiveOne.com), Radio Paradise, and TuneIn.

Apple Music and YouTube Music are conspicuously absent in the app but can be easily streamed to the Pulse M using AirPlay 2. Although music may be streaming outside the app using AirPlay 2, the track appears as Now Playing in the BluOs 4 app, where you can control playback and volume.

Like other connected speakers, you can go to sleep to calm radio or whatever makes you dozy and set a sleep timer to turn off in up to an hour and a half. Or, you can use the speaker to wake you at a specific time by setting an alarm time where you can choose a

The Bluesound Pulse M looks and sounds good, but its mostnotable feature is the outstanding ease of use offered by the BluOS app.

service or a preset to wake to. The settings can be found under the gear icon.

As the Pulse M lacks a microphone, it's missing built-in voice control. Still, Apple Siri and an Amazon Alexa skill can be linked to the speaker to request music and control playback. If you don't have the control app on your iPhone or device handy, try voice control using Siri or Amazon Alexa to play songs or control playback. Siri works best when playing Apple Music. Still, voice control is a weak link on the Pulse M. Both Alexa and Siri occasionally worked but frequently needed help finding the speaker.

The capacitive touch panel under the Pulse M's top glass is handy for controlling playback when you are near the speaker. A quick tap on one of the preset dots starts your favorite music without having to look for your phone. Bluesound offers the $60 Bluesound RC1 Remote Controller with 10 presets, volume, and playback control for those who prefer a physical remote control.

Pulse M's graceful exterior encases what Bluesound calls an "omni hybrid" driver arrangement, allowing the speaker to fill the room with 360-degree sound. This is accomplished using a 5.25-inch up-firing woofer whose sound hits an acoustic reflector that diffuses sonic artifacts. Two 45-degree facing tweeters throw audio out into the room, creating a stereo effect from a single speaker.

A 50-watt DSP smart amplifier powers the woofer and two separate 15-watt amplifiers power the tweeters. These amps supply dedicated power to each speaker as the DSP controls the frequency bandwidth and dynamic range, reproducing instruments and vocals with wider sound dispersion. The Front Row filter functions similarly to loudness compensation, boosting mids, vocals, and highs for increased clarity.

FIRST IMPRESSIONS

After my recent experience of repeatedly getting lost in the DTS-Play-Fi app, the BluOS 4 Controller app was a pleasure. Not only was it easy to return to the previous screen by swiping down the settings or Now Playing screens, but the navigation bar at the bottom made it fast to display the home screen, favorites, music sources, players, and a search screen. Plus, a switch at the top of the Now Playing screen let me toggle back and forth to display my Play Queue.

Setup consists of a wizard that helps you connect the speaker to Wi-Fi, and then it's easy to connect to AirPlay and Bluetooth in the iPhone settings. I needed to change the Wi-Fi connection, which required unplugging the speaker to reboot it and reconnecting to another network router.

When I first opened the box, I liked the sleek look of the speaker, which fit perfectly on a side table in my living room. Upon plugging it in, I noticed the elegant, simple graphic lights of the touchscreen controls illuminate under the top glass as I reached to position the speaker. Moving away, the speaker returned to its hidden black state.

Impressivey, from the first time I used it onward, the speaker easily filled the room with sound (as long as the volume was above 50%). I could enjoy it equally well from the sofa or a chair across the room.

TESTING

As I began testing the Pulse M, it was immediately apparent that it was a serious upgrade from typical Bluetooth or wireless speakers. While it performs well in its basic settings, enabling the Front Row filter made it stand out even more as it brightened the midrange and vocals, filling the room with sound.

As Front Row may be too bright for some listeners' taste, the audio can also be enhanced using tone adjustment. When Front Row is enabled, it supersedes any other audio settings, and the tone adjustments aren't visible in the Settings menu. As soon as I switched the filter off, I was able to adjust the bass and treble, which improved the speaker's sound, but I ultimately preferred

At a Glance

- \+ BluOS 4 Controller App is easy to navigate.
- \+ Full bodied, room-filling sound
- \+ Attractive, modern design
- \+ Capacitive controls only light up when in close proximity
- − Equalizer controls are limited to treble and bass
- − No built-in voice control
- − Alexa and Siri voice control is spotty
- − Play queue wipes out previous songs when adding a new track

Price: $399

BLUESOUND PULSE M WIRELESS SPEAKER

the Front Row setting's more forward sound..

Initially, the bass sounded flat and indistinct until I noticed the speaker's Output Mode was set to Stereo, and I used one speaker. (Other modes include Left or Right, which would help set up a stereo pair.) Setting it to Mono made all the difference. The speaker now had an excellent dynamic range but needed more to satisfy users who prefer heavy bass-forward sound.

One of my go-to audio quality-testing songs is "As Wichita Falls, so falls Wichita Falls" by Pat Metheny and Lyle Mays. Background percussion sets a gentle beat, with the haunting keyboard effects and spoken word coming forward. Throughout the twenty minute song, every sound was distinct, separated, and clear, but it lacked the emotional reproduction of a high-priced system.

Streaming the duo's "September 15th" YouTube video via AirPlay 2 from my Mac Studio maintained nearly the same level of sound quality with no discernible lag or latency. The Pulse M would make a great external speaker to level up my Mac's audio.

AirPlay 2 is also used instead of Chromecast in the iPhone's YouTube Music app. Listening to Joni Mitchell's "Both Sides Now" 2000 version, I was surprised that this was only CD-quality and not a high-resolution stream. With Front Row enabled, there was excellent separation and clarity of the whole orchestra accompanying Mitchell. The strings came through melodically, along with the woeful muted trumpet. Still, the Pulse M lacks the musicality of each instrument and the emotional nuances of Mitchell's voice that I've heard on the SVS Soundbase and speakers.

Streaming with aptX HD enabled Bluetooth is also CD quality. The Spinners'

Specs

SUPPORTED AUDIO FORMATS: MP3, AAC, WMA, OGG, ALAC, OPUS; Hi-Res: FLAC, MQA, WAV, AIFF
HIGH-RESOLUTION AUDIO SUPPORT: Up to 192 kHz sampling rates, 16-24 bit depth
AUDIO OUTPUT: 80W total (50W woofer, 15W x 2 tweeters)
SPEAKERS: 5.25» woofer, 0.75» tweeters
FREQUENCY RESPONSE: 60Hz-20kHz (±1.5 dB), extends to 40Hz at -10 dB
DISTORTION: THD+N at 0.03%
AUDIO CONTROL: Via BluOS Controller App
NETWORKING: Supports up to 200,000 SMB files
MUSIC SERVICES: Spotify Connect, Tidal Connect, Roon Ready
VOICE CONTROL: Amazon Alexa compatible
WI-FI: Dual-band Wi-Fi 5 (802.11ac)
BLUETOOTH: Version 5.0 aptX HD
ETHERNET: Gigabit 1000 Mbps
INPUTS: Mini Toslink/Stereo 3.5mm combo, USB Type A (FAT32)
OUTPUTS: 3.5mm stereo headphone, wireless to Pulse Sub+
CONTROL FEATURES: LED indicators, touch LED for play/pause, volume, track navigation, and presets; proximity sensor
FINISH OPTIONS: Black or white, matte satin paint
INCLUDED ACCESSORIES: AC Power Cords (120V & 230V), ethernet cable, optical to 3.5mm adapter, safety/warranty guide, quick setup guide
POWER CONSUMPTION: Max 79W
OPERATING CONDITIONS: 32°F to 104°F, 20% to 80% RH
DIMENSIONS: 6.7 x 8 x 5.9 inches (W x H x D)
WEIGHT: 5.6 lbs

"It's a Shame" from Tidal had clean vocals that filled the room. But Bluetooth would likely be my last choice for how to connect to the speaker. When streaming from a phone or device, every sound is played on the speaker. There are constant interruptions from notification dings, keyclicks when typing on the source device, or interruptions of playback when switching away from the music app.

What's more, once you connect your phone using Bluetooth, the default is for the phone to automatically connect any time you are within reach of the speaker. A setting in BluOS 4 lets you control when you want to connect to the Pulse M via Bluetooth. It can be found in Settings > Player > Customize Sources > Bluetooth. Choose manual connection instead of an automatic one.

On the other hand, Wi-Fi is the best choice for playing music on the Pulse M. The music sources in the BluOS 4 Controller app stream to the speaker wirelessly (except for Spotify, which uses Spotify Connect).

The quality of the sound varied depending on the quality of the music source. Sam Burton's "Nothing Touches Me" on Radio Paradise's Main Mix had decent bass, but when I streamed the same mix in CD quality from the service, the bass was more precise, and I could distinguish the bass drum from the snare.

While sound quality is important in choosing a wireless speaker, if it's hard to use or confusing to change music, I will rarely use it. The BluOS 4 Controller app has done it right. From the customizable home screen to a common-sense navigation bar at the bottom of the app screen, it's easy to navigate and control playback.

I particularly appreciate how easy it is to start playing my favorite music. Access five presets from the top of the speaker or ten presets on the optional RC-1 remote, but there's room for a whopping forty presets

from the app for direct access to the music you listen to regularly.

Presets can be set for various services. I added a playlist from Amazon Music, my Caro Emerald Pandora Radio Station, Oregon Public Radio on TuneIn, the Margaritaville channel on Sirius XM, the Radio Paradise Mellow Mix, and a John Mellencamp *Orpheus Descending* Album. Because Spotify uses Spotify Connect, taking you out of the BluOS 4 app, Spotify playlists, songs, or artists can't be added to the presets.

Unlike the excellent global search on the Sonos app, BluOS 4 only searches one service at a time. Still, there is a single search page where you choose which service you want to search from a pull-down menu. Type in the query once, and if you don't find it, you can just pull down to instantly search the next streaming service. I was looking for the "Making Movies" album by Dire Straits and wanted the best audio quality. I found it in Ultra-HD on Amazon Music and MQA on Tidal.

The only epic fail of the BluOS 4 app is the Play Queue. Unlike other apps, the songs in the queue are wiped out when you exit the app, when you choose to play an album, or if you choose a song and tap "add next." I quickly learned that when adding to the queue, it's best to select "add to last" from the menu as that preserves the songs and albums previously added to the queue.

I could change the order of tracks in the queue by tapping an icon in the bottom navigation bar without removing other tracks from the queue. I could tap a song in the queue to play it. But once I left the list and played an album, the album was added to the queue, and the previous list was gone.

Because BluOS allows for adding songs, albums, and playlists to the queue from several services, when putting together a mixed queue (each time choosing "add to last"), be sure to save it as a playlist before starting to play music, or all your hard work could vanish with the tap of the play button.

CONCLUSION

The Pulse M's musicality is on the level you expect from tits price point. It's stellar for background music when doing tasks—working on the computer, dusting the living room, cooking—and with its large soundstage, it's also a terrific choice for parties. And it will occasionally surprise you with audio tracks that sound so good you'll stop and listen.

The crisp and clear midtones and vocals will satisfy all but the most bass-loving fans. However, by adding Bluesound's Pulse Sub+ might make up for any of the Pulse M's low-frequency shortcomings.

With its easy control, the Pulse M will likely become the way you listen to music every day, whether you create a playlist that you add to a preset and tap the speaker to play it or search for specific music that suits your mood. Plus, its simple aesthetic won't make you curse that it's messed up the look of your living room.

The Verdict

While the Pulse M doesn't have the musicality of higher-priced wireless speakers, it's a solid performer, especially at top volume. Its driver configuration does an excellent job of filling the room with sound. Plus, it's a joy to use, as the BluOS controller app is one of the best-designed controller apps for any wireless speaker.

HISENSE 65U8K MINI-LED 4K TV

The Price is Right

By Tom Norton

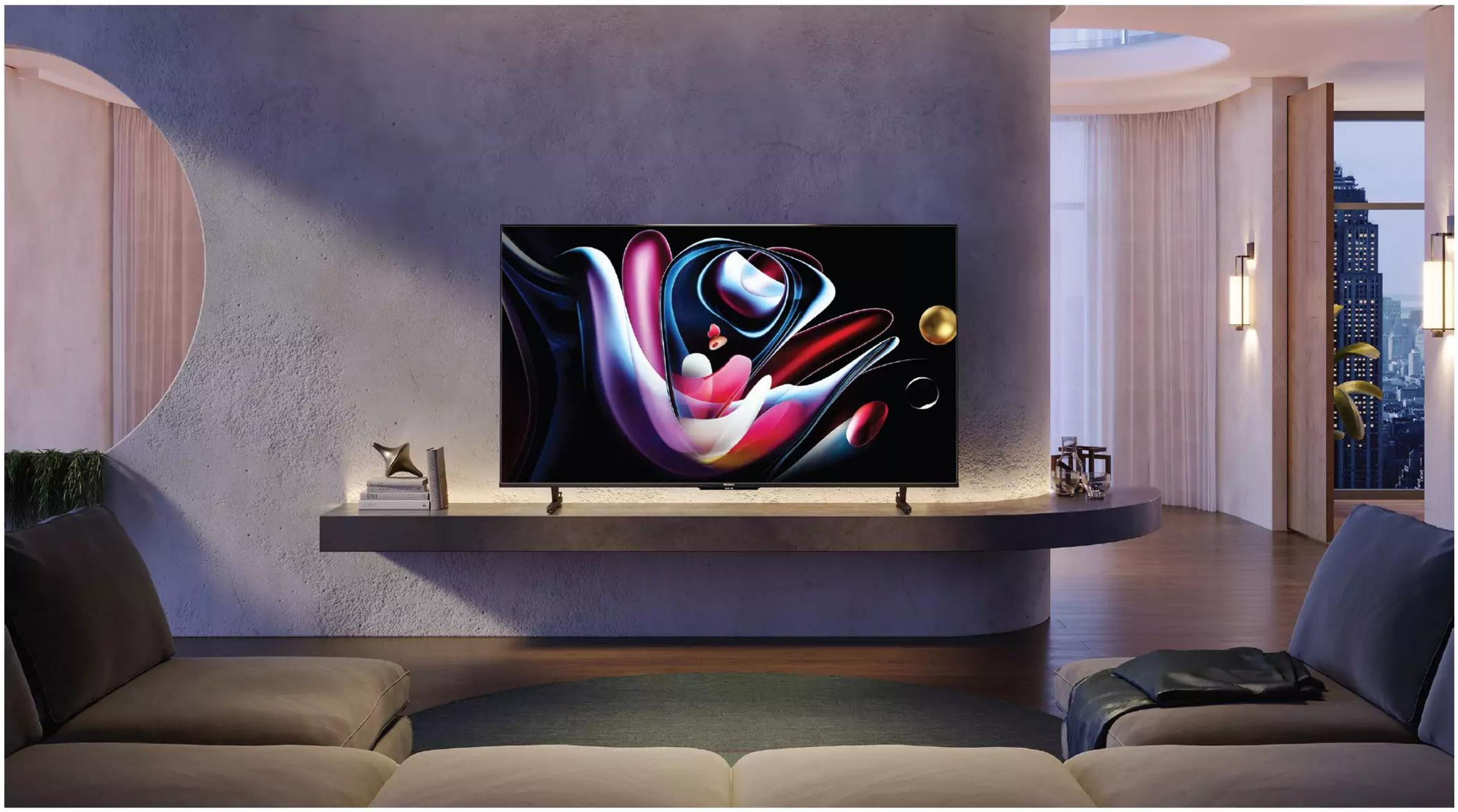
RATING

PERFORMANCE ★★★★½

FEATURES ★★★★½

ERGONOMICS ★★★½

VALUE ★★★★★



HISENSE IS a major supplier of all types of appliances but is known here in the USA and in much of the world for its video products, including short-throw projectors and flat-screen televisions. The Hisense 65-inch, 65U8K, under review here, offers a wide range of features, but perhaps the most jaw-dropping is the price for Hisense's top-of-the-line 65-incher.

While Samsung (Korea), LG (Korea), and Sony (Japan) remain the worldwide television sales leaders, two Chinese companies, Hisense and TCL, are charging hard and hold the four and five spots, respectively. Hisense first came to our attention as a leading supplier of short-throw home projectors and for their company name, a curious collision of English words (High + Sense).

All of Hisense's flat-screen TVs are LCD or LED-LCD designs. The company doesn't offer OLEDs. Nevertheless, nothing appears to have been left out of Hisense's top-of-the-line, U8K-Series. Their mini-LED local dimming offers enough zones (Hisense doesn't specify exactly how many) to almost make you forget about OLED's leadership in the deep-black-levels club. And at the opposite end there was enough brightness on hand to prompt me to dial it back a bit even on SDR material. Is it the absolutely brightest 65-inch LCD set you can buy? Perhaps not, but do you need brighter, even for HDR? I doubt it, unless you plan on watching the big game on the sun porch by the pool in Florida at noon on a cloudless day in July!

Pictured here is the Hisense 65U8K, boasting mini-LED local dimming, quantum dot color, dazzling brightness, and a surprisingly budget-friendly price tag.

SETUP AND FEATURES

You can't miss the Hisense's features even before unpacking it; they're printed right on the box: 2-year warranty, Wi-Fi, Filmmaker Picture Mode, Google TV, Dolby Vision Atmos (sic: actually Dolby Vision and Dolby Atmos; they're separate features that are often but not always found together on a given source, but are often conflated, as Hisense does here), Quantum Dot Color, Peak Brightness 1500 nits (I measured higher on HDR even in the least bright modes), Game Mode Pro up to 144Hz, Mini LED with

Hi-View Local Dimming, Hey Google Voice Remote or Hands-Free Voice Control, Alexa, Chromecast, HBO Max, Disney+, Prime Video, YouTube, Netflix, mini LED, Apple TV, and Apple Home. There's also IMAX Enhanced, which is a certification program for home audio and video equipment. Somehow, that sounds vaguely familiar (THX 2.0?). But it's also one of the many optional picture modes on the U8K.

You can set up the Hisense on virtually any table; the included stand has two separate feet, attachable either at the far ends of the screen or closer together. The set can also be wall-mounted using a suitable wall bracket (not included). As with most LCD-LED sets, the 65U8K's 3-inch depth won't sit quite as flush to a wall as a similarly sized OLED. Mini-LED TV designs are now offered under various names as premium models from most of today's leading TV-makers. But mini-LEDs are totally unrelated to OLEDs. (Samsung refers to its mini-LED designs as QLEDs, which could, and likely has, misled uninformed TV shoppers.)

A mini-LED display begins with a layer of LCDs that actually produce the images. But those LCD images need backlighting to generate a visually recognizable, full-color result. Here, as in most mini-LED designs, the backlighting is a mixture of mini-LEDs and quantum dots. When electromagnetic energy strikes particles called quantum dots, they emit light. The color emitted depends on the size of the dot and the wavelength of the light that strikes it. The light to energize the quantum dots typically comes from LEDs, with the associated quantum dots offering a wider, deeper range of color than LEDs alone can manage.

But don't confuse mini-LEDs displays with micro-LEDs. The latter is a totally different technology that's available today only by a special (likely prepaid) order, and only in large sizes. Their prices are also eye-watering. It's a promising technology, but the operative word remains "promising." The only place I've actually seen micro-LED displays (marketed under several different names) has been at trade shows such as CES and CEDIA. (I also understand that a few years back Samsung configured a movie theater in LA with micro-LEDs, but whether or not it remains in operation I don't know.)

Mini-LEDs are small enough for Hisense to employ thousands of them, arranged into multiple zones for superior local dimming. Hisense doesn't specify the number of zones used here (each zone can employ more than one mini-LED, and the number of zones may vary with the screen size). But the zones were close enough together here to defeat my attempt to accurately count them via a local-dimming test pattern.

But as with the roughly comparable 85-inch TCL set I reviewed in a recent issue, the Hisense's Full-array Local Dimming, set to High, was exceptionally effective in offering solid blacks and virtually invisible black bars on widescreen movies, even when viewed in a totally darkened room where errant black levels tend to be most visible. When local dimming is turned off, however, those black bars change to deep gray and could be clearly seen.

As with most of today's HDR-capable TVs, the Hisense 65U8K is compatible with most HDR sources, including HDR10, HDR10+, Dolby Vision, and HLG. In the U.S. Hisense uses Google's smart TV platform. In contrast to some recent smart TV platforms

At a Glance

- \+ Wide range of features
- \+ Affordable price
- \+ Impressive picture quality
- \+ Comprehensive connectivity
- \+ High refresh rate for gaming
- − Limited off-center viewing angles
- − Calibration and ergonomic challenges
- − Intrusive pop-up ads on smart platform

Price: $999

www.hisense.com

HISENSE 65U8K MINI-LED 4K TV

Test Bench

All the measured results were taken using CalMAN measurement software from Portrait Displays (www.portrait.com), together with X-Rite i1Pro3 Plus and Klein's K10-A color meters and a Fresco Six-G pattern generator from Murideo.

For the subjectively derived control settings I eventually used, go to soundandvision.com.

On an 18% white window in SDR at an output 160.5 foot-lamberts (548 nits), the Hisense measured a black level of 0.011 foot-lamberts (0.038 nits) for a full-on, full-off contrast ratio of 14,590:1.

On an 18% white window in HDR at an output 1718 nits, the Hisense measured a black level of 0.0061 nits for a full-on, full-off contrast ratio of 28,633:1.

In HDR the Hisense covered 80.1% of the BT2020 color gamut and 95.8% of P3 color (1976 standard).

In HDR the Hisense measured 1000 nits in a 1% white window, 1500 nits in a 5% window, 1800 nits on a 25% window, and 700 nits in a full screen white window.

Specs

DIMENSIONS: (W x H x D, inches): 57.2 x 33.1 x 3.0 (without stand); 57.2 x 35.5 x 12.6 (with stand)
WEIGHT: (pounds): 56.4 (without stand); 58.26 (with stand)
VIDEO INPUTS: HDMI 4 (2 x HDMI 2.0, 2 x HDMI 2.1, eARC on HDMI 3) AV (L/R composite audio/video)
AUDIO: Headphone out, optical digital audio out (Toslink)

I've experienced it didn't result in an overly cluttered screen. But in YouTube it was prone to obnoxiously frequent pop-up ads, including messages urging me to sign up for a Google account. As always, I declined to do so. The Hisense also offers voice control via the remote control, though I avoided that as well (past experience suggests that my vocalizing is rarely simpatico with such devices).

There are four HDMI inputs, two of them HDMI 2.1 (annotated as 144 kHz). Input 3 is eARC-capable. The set's video gaming features include VRR (Variable Refresh Rate, Game Mode Pro (reduces image lag), and up to that maximum refresh rate of 144 kHz. Using the Bodnar 1080P image lag meter I measured 107ms in Filmmaker mode and 9.7ms in Game mode.

The ergonomics of Hisense's picture adjustments were a little confusing at first. There are separate settings for SDR and HDR-—not only for HDR in general but for various flavors of HDR such as HDR10 and Dolby Vision. Motion Enhancement was engaged by default out-of-the-box in all of the modes I tried. I turned it off manually, though in Low it was mildly tolerable. There are also separate settings for Blur and Judder, plus a Motion Clearness setting that adds dark frame insertion. The latter is less prone to the soap opera effect that typically plagues other forms of motion compensation, but dark frame insertion dramatically dims the picture.

Apart from sampling these motion features I left them off for all of my viewing. The Hisense's motion handling was otherwise nothing unusual—a comment I could make about any other TV I've reviewed recently.

The Hisense shares one common limitation of most LCD-LED TVs. Once you move well off center (say, beyond 20-30 degrees) the image begins to fade with increasingly muted colors. That's endemic to the species, and most buyers learn to deal with it. OLEDs, however, can do far better for a big family or that Super Bowl party. Another issue that can sometimes turn up on a flat screen TV is a lack of screen uniformity, a blotchiness most clearly visible on a full-screen, dark gray test pattern and often referred to as the "dirty screen effect" or DSE. I saw no sign of this on the Hisense.

Audio employs several loudspeakers that fire out from the rear and bottom of the cabinet. There's also a "subwoofer" on the back. As I've often commented in other reviews, you can't effectively generate the height effects of Dolby Atmos from speakers confined to the inside of the TV cabinet. But with some sources the Hisense did provide a sense of spaciousness extending beyond the confines of the TV itself. The audible result was noticeably better than routine TV sound. There's also a feature that attempts to automatically optimize the sound to the room, which didn't do much in my situation (all rooms are different). There are also several audio settings offering various sonic flavors, but the only one that worked for me was Music, complemented by appropriate adjustments to the TV's available graphic equalization controls (boosting the bass and cutting the treble).

Following those adjustments the Hisense's audio, while certainly no match for a full, separate audio system or even a premium soundbar, was easy on the ears, well balanced and offered clear and relatively natural dialogue.

The remote control was adequate though a bit small, with direct access buttons for Netflix, Prime Video, Disney+, Tubi, and YouTube. While it's not backlit, most of the controls were easy enough to find in the dark after I gained some familiarity with it. But I did occasionally hit the wrong button, ending up out somewhere in left field and forcing me to backtrack and start again. You can always use voice control, of course, but as noted earlier I choose not to go that route.

HDR AND SDR

The Hisense 65U8K has its share of ergonomic shortcomings. Most of them were related to the layout of the adjustment menus that occupy half or more of the screen's space while you're trying to judge what's going on. Ultimately, I settled on using subjectively derived "calibration" settings, a decision that might make techy users uncomfortable. It does for me as well, but only marginally considering that at this price level, not many buyers be willing to pay for a pricey calibration.

My guess is that most buyers would be reluctant to pay roughly $400 for a professional calibration on a $900 TV. So in my initial dry run, using the main picture controls but not the dedicated calibration settings (White Balance, Color Tuner, etc.), I set all of the standard controls manually for SDR, HDR10, and Dolby Vision and achieved what I judged to be both a visually pleasing and (I hoped) relatively accurate result. This was neither a fast nor casual exercise; it took several sessions to achieve the best result. I'll begin with HDR first, both HDR10 and Dolby Vision. The latter required somewhat different settings than HDR10.

I immediately had one serious reservation about Hisense's picture adjustment menu. When you call it up to make a visual change, the menu occupies the entire left half of the screen leaving visible only the right side

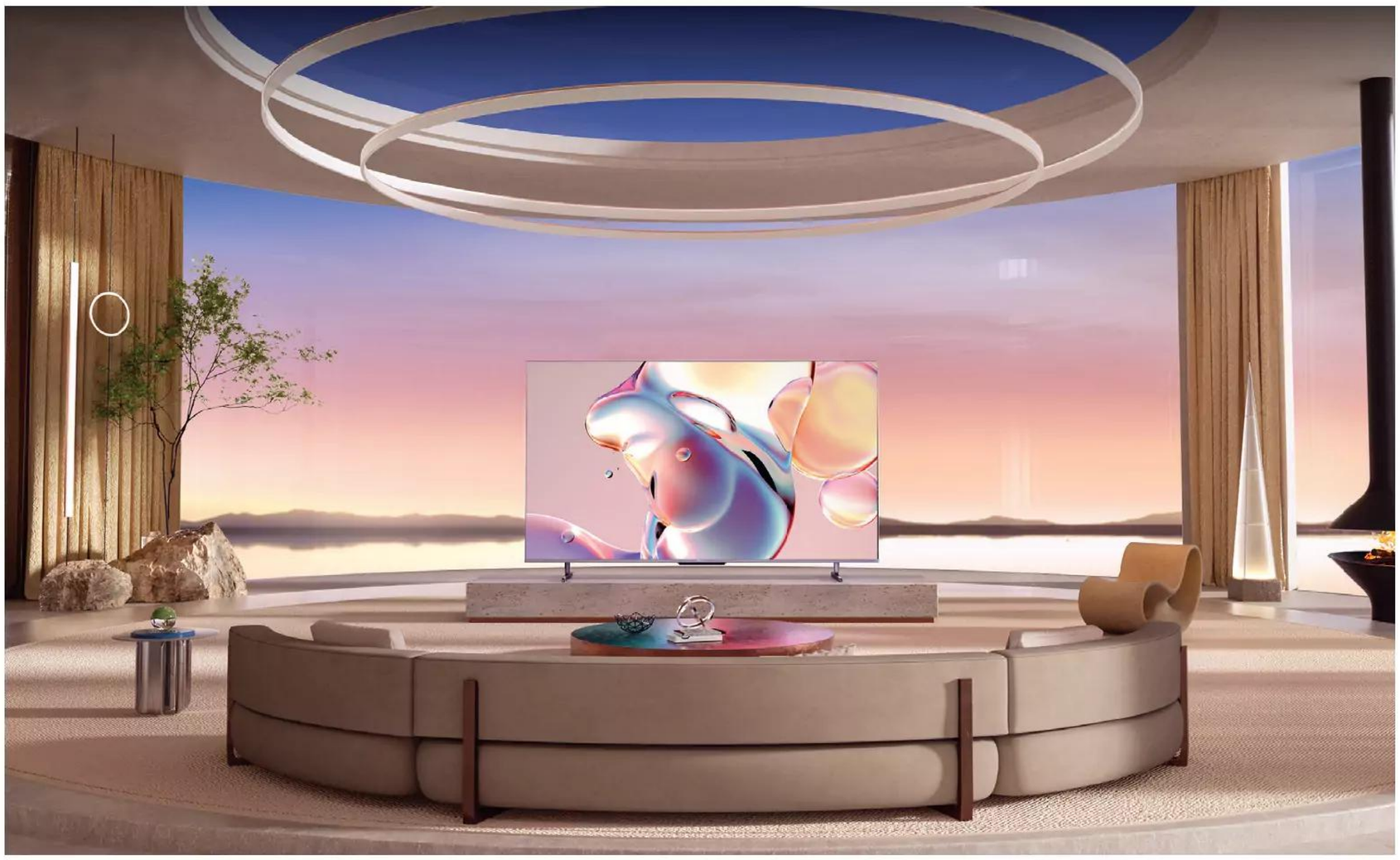
of the program's image. But it gets worse; when you then select the control you wish to alter, a smaller but still annoyingly intrusive window opens in the *lower right corner*. Both of these obstructions together obscured more than half of the image you're attempting to judge and adjust visually. To get a better look you then have to close the menus to see the result of your efforts on a full screen, then repeat this back-and-forth dance as many times as necessary until you get the desired outcome.

This proved to be an even more annoying issue when doing formal calibrations, where the calibration windows themselves sometimes even blocked the meter used for the calibration, resulting in unpredictable and often erroneous results. I managed to work through all of this in both my eyeball changes and later formal calibrations, but it was irritating and time-consuming.

The subjective settings that worked best for me were highly pleasing, though not identical to the out-of-the-box default settings. *Oblivion* (HDR10) is a title I've used often in evaluations of televisions under review. But it's one title that in the past has typically looked better to me in its SDR version rather than in HDR. But not here. With crisp but not overdone detail, believable colors, particularly in its flesh tones (with rare exceptions this movie's colors are mostly subdued shades of gray and brown) and HDR highlights that enhanced the film rather than dominating it, this title has never looked better than it did on the Hisense with my visually derived but not yet totally calibrated settings.

The results were much the same on *Blade Runner 2049* and *Oppenheimer* (both of them also HDR10. It was hard to stop watching. In fact, this was my first non-theatrical viewing of *Oppenheimer* and I watched it from beginning to end, finishing up at about 1:30 a.m.!

The new 4K release of *Titanic* (Dolby Vision HDR) was also a treat on Hisense, though sometimes in negative ways. The 2000 film employs heavy doses of CGI,



and while it was well done, the clarity of the new, fully remastered HDR version sometimes made the presence of CGI clearer than before.

Fortunately, however, as seen on the Hisense these reveals weren't visible enough to spoil the viewing experience.

SDR titles drew me in as well. The brilliant colors in *Victoria & Abdul*'s banquet scene, with its riot of reds and crisp detail were impossible to miss. *A Knight's Tale*, with its brilliant jousting sequences, was just as impressive. Both titles made it quite clear that while 4K HDR is a major advance, well-done older SDR 1080p titles can make for compelling viewing experiences as well. The only reservation I had here was that the colors in *A Knight's Tale* were just a little too warm, though that might have been intentional to give the film a medieval look.

CALIBRATION IRRITATION

A formal calibration of the Hisense proved to be problematic. The issues appeared to be a combination of the TV itself (including the configuration of the adjustment menus that, as noted earlier, sometimes got in the way of the measurements) and problems with my test gear. I won't bore you with the gory details, but they involved issues in getting my meters and the on-screen menus to play well together. I spent days trying to do better, amply demonstrated in the 43 pages of my densely filled notes (or sparsely filled, depending on my varying level of frustration).

Most of my measurement headaches resulted from the test meters breaking lock for no obvious reason, requiring that they be re-initialized, the program re-booted, and all of my test data re-inserted into the menus. This can't of course be blamed on the Hisense. And just when I thought I had it all solved with better-seeming numbers, the resulting visuals, particularly in HDR, simply looked wrong. Reds and greens were obviously overblown. Odd artifacts were also visible on the HDR demo sequences from the Spears & Munsil *Ultra HD Benchmark* test disc. The issues appeared to involve, at least in part, Hisense's color calibration menus and how their on-screen placement made reliable calibration a catch-as-catch-can exercise. It wouldn't be fair to completely blame the Hisense for all of the problems I encountered, but the layout of the calibration menus didn't help.

But when I returned to my subjective settings rather than continuing to fight in the calibration game, the magic returned. All of the sources I tried again, and more including SDR (*A Knight's Tale*, *Tangled, Victoria and Abdul*), HDR10 (*Tangled*, Spears & Munsil's *UHD Benchmark* for its demo material) and Dolby Vision (*Titanic*) looked as good or better than they ever did on any TV I've previously reviewed.

CONCLUSION

The Hisense 65U8K offers a blend of affordability, advanced technology, and impressive performance that challenges the dominance of more established brands. Despite its ergonomic and calibration challenges, which may deter some enthusiasts seeking the ultimate precision in picture quality, this TV delivers where it matters most: in providing a visually stunning viewing experience across a wide range of content. Its array of smart features, comprehensive HDR support, and gaming capabilities make it an attractive option for a broad audience, from movie buffs to gamers.

The Verdict

I wouldn't choose the U8K for a video mastering suite. But if you are looking for a TV that punches far above its price, the Hisense generated more OMG moments from the best source material than I can recall from any TV I've previously reviewed. The only thing keeping it from earning an even higher performance rating is its limited off-center viewing—an issue with most LCD-based televisions.

STARKE SOUND SW15 SUBWOOFER

Wonder Twins

By Jim Wilson

RATING

PERFORMANCE ★★★★★

FEATURES ★★★★½

BUILD QUALITY ★★★★½

VALUE ★★★★★

SUBWOOFERS, AN ESSENTIAL component for every home theater system. Unless you have an extraordinary set of speakers the same holds true for a two-channel setup, you need a sub to reinforce the bottom end. While their contribution is critical for the reproduction of full-range sound, for the most part they aren't much to look at. Often little more than square black cabinets, subwoofers rarely enhance the aesthetics of your HT room. I've reviewed over 50 of them in the past 12 years and in that time very few have visually differentiated themselves from the rest. The Starke Sound SW15 is no exception from an appearance perspective, but can it stand out from the crowd in some other way?

Price would be the first potential area, you certainly won't find many quality sealed subwoofers with a 15-inch driver selling for $699. Starke Sound has the cost aspect covered, but what about sound quality and performance?

Benjamin Franklin is attributed with having said "the bitterness of poor quality remains long after the sweetness of low price is forgotten". In other words a low purchase price is an initial win perhaps, but over the long haul you may regret not having spent more. Thus far the scorecard shows that appearance can be considered fairly generic and the price is quite reasonable. The only thing left to determine is how the SW15 performs, that's where we'll concentrate for the rest of this article.

IMPRESSIONS

The SW15's enclosure is about as small as you can get for a 15-inch subwoofer, so much so that at first I thought Starke may have sent me their 12-inch version by mistake. Glancing over at the model number silk screened onto the plate amp showed it was indeed the SW15. This subwoofer is certainly living room friendly. Starke sent me SW15's in both available finishes; the black version uses a matte wrap with a slight texture, while the white wrap uses more of an eggshell-type finish. Neither are glossy. The cabinets have a very slight roundover at the edges which softens the boxy look somewhat.

For folks who want their subwoofer to blend in with the decor I suggest you leave the SW15's grille on. It's a nice looking fabric mesh over a 1.5" thick MDF that's been painted black, the outer edges are beveled at a 45° angle to incorporate some style. Located on the top is a BREV logo plate with a brushed aluminum finish that has the same shape as the grille itself (BREV is short for Brevity, Starke Sounds more price-focused product line). It looks rather classy. If you would prefer a more industrial feel however, you'll want to take the grille off.

The SW15's driver has a menacing appearance; the cone material looks like raw carbon fiber. With no protruding dust cap, you essentially get one big bowl of it. The surround is of the high-roll variety - rather than the typical and more shallow half-roll variant—which further enhances the threatening nature. That visual becomes even more appealing when you push the SW15 and see just how far the cone moves back and forth, it's actually kinda fun to watch if I'm honest. While the grille is a very stout piece, and does have a stylish air to it, I left it in the box because I wanted to watch the driver in action.

Small detail alert... recently I've taken to highlighting seemingly trivial features that differentiate one subwoofer from another. In a world of outwardly indistinguishable products, the quest to identify unique characteristics has become increasingly important to me. This time however, it's not directly about the SW15, but Starke Sound specifically.

Generally speaking, when you buy from an internet direct company you can pay with a credit card and sometimes PayPal.

That's typically it though. Starke accommodates far more options, listed in alphabetical order: American Express, Apple Pay, Diners Club (does that still exist?), Discover, Google Pay, MasterCard, Meta Pay, PayPal, Shop Pay, Venmo and Visa.

LISTENING/IN USE

At the time of this review Starke ran a special of two subs for under $1,000, so I requested Starke send me a pair, and why not? If I were in the market for a subwoofer like this I'm for sure taking advantage of an offer like that. One of the true benefits of multiple subwoofers is they can be used to balance out

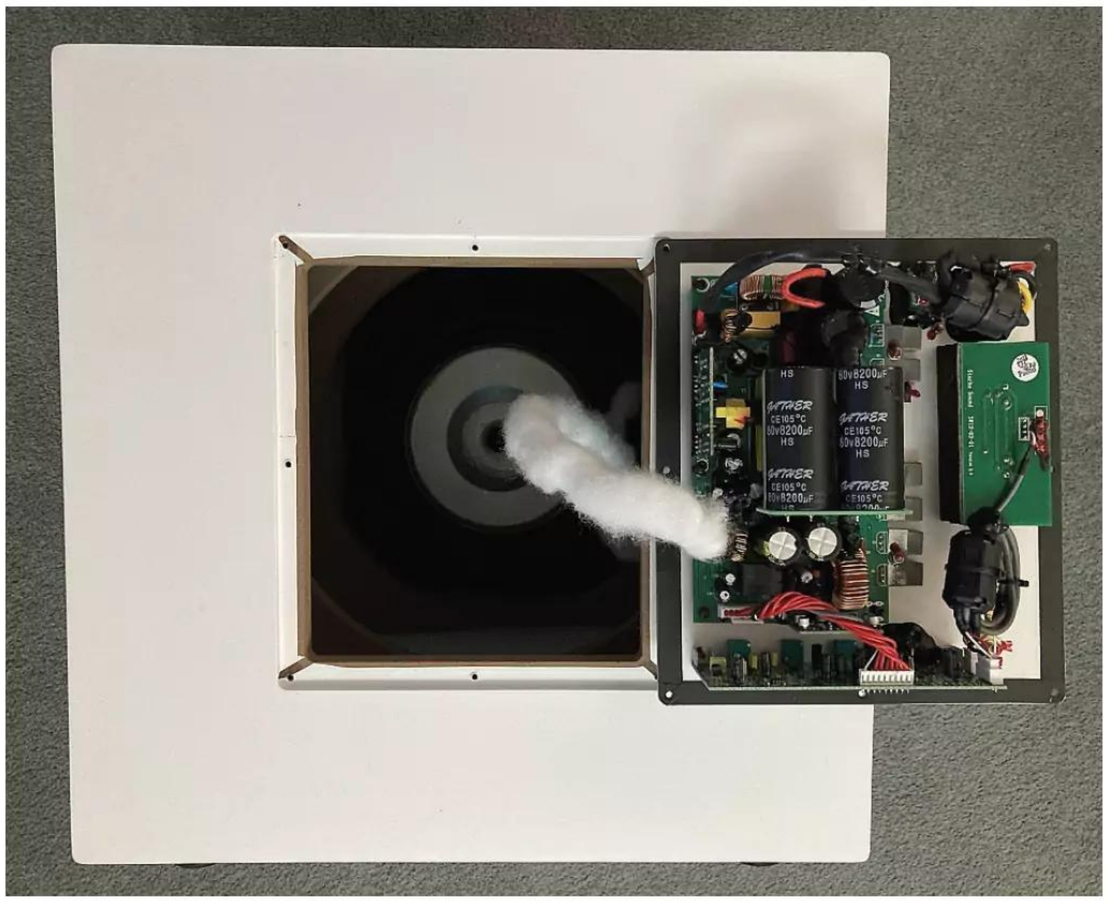
the frequency response in the room. That's assuming you have latitude to place them in ideal locations and can use a measurement system to fine tune their individual output. I'm not in the position to place subs in different parts of my room unfortunately so I resorted to stacking them one on top of the other.

When working with more than one subwoofer—regardless of where they are placed in a room - you have to ensure their respective outputs are the same at the MLP (Main Listening Position) for a given AVR volume as you don't want one sub handling more of the load than the other(s). Gain matching in a multi-subwoofer scenario has some drawbacks however; manufacturing differences mean the output from subwoofer A set at the 12 o'clock position on the dial might not be the same as subwoofer B set the same way ("gain" in this case means the "volume" knob on the subwoofer's amplifier). My preferred method is to independently level match each sub using an SPL meter while seated at the MLP, which is what I did with the SW15's. Once I knew they were both equally matched it was time to get serious.

With few exceptions, small subwoofer cabinets mean a lot of DSP (Digital Signal Processing) has been applied to shape the output. This digital wizardry is an attempt to overcome limitations associated with physics. "Attempt" is the key word, however, as laws of physics are unyielding, meaning algorithms can only go so far. If an amplifier and driver combination are not specifically designed to be used in a compact enclosure, the amount of DSP required tends to affect not only the sound quality, but also output capabilities. That means bass can sound strained at high volumes, loose detail or have limited dynamic range. None of that is good of course.

A rough approximation of how much DSP has been applied can often be gleaned by the amount of distance added when you run your receiver's room EQ; the greater the number of feet beyond the actual physical distance, the more DSP there is. When I ran room EQ on the Starke Sound SW15, physical distance versus calibrated was a mere 2 additional feet. Based upon past experience with this AVR and many other subs, that's a low number. Translation: there's probably little in the way of DSP applied, something my ears verified as I started to put the SW15 through its paces.

When I started to push things one of the original units Starke sent me did suffer an amp issue. As I got daring with the volume knob it would shut down. It wasn't a thermal protection circuit as the problem would occur even if the sub was only on for a minute or two. Starke promptly swapped it with another unit; the replacement never shut off unexpectedly during the five weeks I had the SW15's in rotation. During that time it was driven hard on many occasions.



MOVIES

Given that I had roughly the equivalent of a 21" driver with this pair of SW15s I decided to focus on movies with particularly difficult soundtracks. I emphasized scenes that had either very deep bass passages, lots of complex action, long durations of intense activity or some combination of at least two of those. What I've led off with recently is the opening from *Edge for Tomorrow*, and I saw no reason to change that approach for this review.

Although I stuck with my typical MO, I changed it up slightly because I had a pair of subwoofers. Rather than beginning at a toned-down volume level and work my way up, I decided to cut loose and crank it from the get go. As the soundtrack inched through the 5 different levels of the opening sequence the SW15's drivers pulsated wildly, yet not a single unpleasant sound was heard. The first three plateaus in the series were definitively strong - in your face almost - but by the time it got to the last two things tapered off. With the firepower I had staring at me I thought there would be a bit more of a guttural impact with obvious vibrations sent through the floor. The amp was seemingly protecting the driver, but I did wonder if it was maybe a bit too effective.

13 Hours is the story of the siege on a CIA outpost in Libya during 2012. The firefight at the compound starts halfway through scene 15, kicking off the action with a bang (no pun intended). There's an ominous soundtrack that heralds the impending doom; rumbling undertones lent a foreboding sense of what was about to happen. As the combatants open fire on each other their weapons had a sharp, crisp sound with a lot of intensity. Mortars hit with force, exploding with a resounding thud. Every weapon and different type of ordnance was distinct, each having their own sound signature.

In *Flight of the Phoenix,* captain Frank Towns is sent to the Gobi Desert in Mongolia to pick up a group of people and fly them back home after the oil field they worked in was shut down. Shortly after takeoff the plane encountered a fierce sandstorm, the wind from which produced a prominent low intensity grumbling sound.

At a Glance

- \+ Inexpensive
- \+ Small for a 15-inch subwoofer
- \+ Deep, rich sound
- − Generic appearance
- − Takes prodding to wake from standby mode

Price:: $899

www.starkesound.com

STARKE SOUND SW15 SUBWOOFER

Not long into their the flight the plane encounters problems, as it tumbles toward earth there's a pulsating effect that was very pronounced. Once the plane makes contact with earth it begins skipping across the desert sand, creating assertive thumps each time it pounded off a dune.

Despite some difficult material played at high volume the amplifier on both units registered almost no warmth—they didn't seem the least bit fazed by any of it.

Test Bench

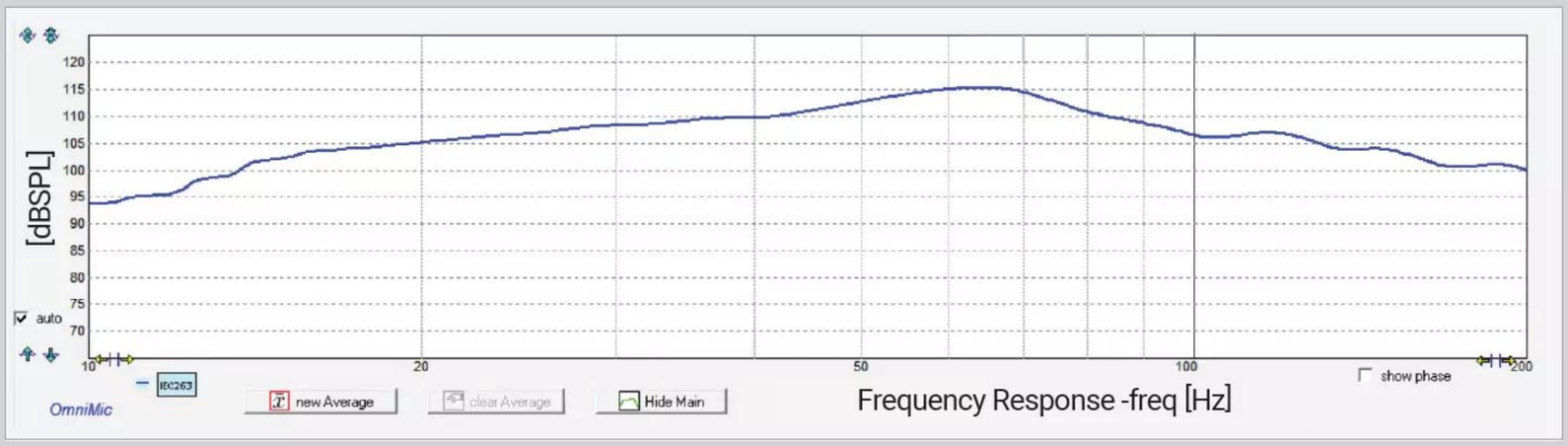


Fig.1 Measurements were taken using an OmniMic. The subwoofer was positioned in the center of my listening room with the microphone tip 1 foot from the driver dustcap. The controls were set as follows: Volume 100, crossover 200Hz, phase: 0°.

Specs

DRIVER: 15-inch glass fiber sandwich cone
AMPLIFIER: 450W RMS, 900W peak
FREQUENCY RESPONSE: 14Hz-240Hz ±3dB
CROSSOVER: 50-200Hz, variable
PHASE: 0-180 degrees, variable
POWER: On/Off/Auto
INPUTS: 1 XLR (balanced), 3 RCA (unbalanced) left/right/LFE
OUTPUTS: XLR
DIMENSIONS: 17.3" x 16.5" x 18.9" (HWD), including feet
FINISH: Black (textured), white (smooth)
WEIGHT: 55 lbs.
WARRANTY: 3 years

MUSIC

After the admirable performance from the Starke Sound SW15 during the movie tests, I had high hopes for the music portion of this assessment. My anticipation

was the detail heard from the film soundtracks would carryover and I would be equally impressed. Given that, I decided to use material from my catalog that I particularly enjoy.

Joe Satriani's *Live in San Francisco* is an old favorite of mine. Not only do I like the music but the recording itself is of a very high quality. I went straight to the song with perhaps the fattest bottom end of the entire performance that night, "House Full of Bullets." Stu Hamm's bass anchors this one with a driving, melodic rhythm that was oh so clear and well defined. It was both powerful and heavy, yet tuneful. Jeff Campitelli's kick drum pounded away in unison, omnipresent, overlaying the bass brilliantly. This is a rollicking blues tune the SW15's ate up.

The opening salvo of Hans Zimmer *Live in Prague* is a medley consisting of "Driving", "Discombobulate" and "Zooters Breakout." Those three set the tone for the rest of this disc. They slowly build to a towering crescendo, beautifully crafted by the 70+ musicians that grace the stage by the end. Inevitably I'm playing this one loud. To put it more accurately, I'm playing this one *loud*. As the musicians start coming in the sound gets hectic and lively, yet the SW15's seemingly enjoyed the challenge. The upright bass and electric bass guitars, drums, and tympani are all recorded on the hot side, but not excessively so. They underpin this composition, producing a sound that was rich, warm and inviting.

Forgoing what was fast becoming a trend in this evaluation—live recordings—I opted to close out the music section with a studio track instead, featuring a song from a very long time ago. From Pink Floyd's seminal album *Dark Side of the Moon*, I went with "Time." That pulsating double-beat that occurs at the beginning was lush and striking, despite the other instruments being recorded louder. The plucked strings from the bass guitar rang out with authority, immediately grabbing my attention. At first they have a very Rickenbacker sense to them, with the more trebly tone that bass guitar is known for. When the song kicks into the rhythm itself, it quickly becomes apparent Roger Waters is now using his more customary Fender Precision, with its meaty sound. The Starke Sound SW15 handled all of it with poise.

CONCLUSION

If you're short on space, but have no desire to skimp on output or sound quality, you should check out the Starke Sound SW15. Its diminutive size and low cost belie what this subwoofer is capable of. The bass is unmistakable, without being obnoxious or overbearing. The SW15 checks all the right boxes.

The Verdict

If you want the horsepower of a 15-inch subwoofer but can only accommodate an enclosure that typically comes with a 12-inch sub, the Starke Sound SW15 might be where your search ends.

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The Audio Foundation:
The Sound Organisation
Theoretica Applied Physics
Tien Audio
Tom Christiansen Audio
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Trafomatic
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Triangle Art
Ultra Fidelis
Upscale Audio
VAC/Valve Amplification Company
VANA Ltd
VANATOO
Vandersteen Audio
VIABLUE™
Vinnie Rossi
Vitus Audio
VK Music
Von Schweikert Audio
VPE Electrodynamics
VTL
Wadax
Wally Tools
Warwick Acoustics
WattGate
WBT-USA
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HISENSE C1 RGB LASER MINI PROJECTOR

Fun³

By Michael P. Hamilton

RATING

PERFORMANCE ★★★★½

FEATURES ★★★★★

ERGONOMICS ★★★★★

VALUE ★★★★★

ALWAYS UP for a projector review, I unhesitatingly responded, "Send it my way!" when asked about the Hisense C1, though admittedly, at the time, I was unfamiliar with this new model. Having previously reviewed the UST Hisense PX1-Pro and been impressed by its triple-laser light engine—giving it an S&V Top Pick—I was keen to explore any advances made by the self-proclaimed pioneer in Laser TV in the dynamically evolving projector technology category.

Days later, while exchanging my signature for what Big Brown had wheeled in, one of the boxes prompted a pause. Anticipating the Hisense, only one of the parcels appeared to have the capacity to contain a projector; curiously, it was square.

Recently logging feverishly long "day job" hours with sleep elusive more than practiced, I eyed the box puzzled, wondering if a dream about F1 world driving champion Max Verstappen vowing to send me an autographed race-used helmet was, in fact, real.

I eagerly opened the package only to discover that 'Mad Max' had failed me. Fortunately, the actual contents were far more intriguing, so much so it had me dismissing the Dutchman's broken promise (and hastily recanting unflattering utterances about childhood visits to tulip-lined Lake Michigan shoreline community Holland).

UNPACKING

Removing all wrapping revealed this was indeed the projector, as confirmed by the Hisense logo directly above a sensor encased within a flush oval trim piece in the top left quadrant of the casing with a companion is located to the right of the lens—used for autofocus and to monitor auto keystone correction in real time.

A time-of-flight sensor works with the CMOS duo, assisting with autofocus and functioning as an eye protection monitor. A time-of-flight sensor, paired with CMOS technology, helps improve autofocus and also serves as a monitor for eye safety. Highlighting its compactness as a major selling point, this device caters especially to young users who might be close to its lens, similar to ultra-short throw (UST) projectors. The device smartly incorporates an eye safety feature that activates automatically from a safe distance away from the projector's front, even though this safety feature can be adjusted or turned off in the settings menu.

Hisense alerts that risks are inevitable even with the feature enabled and cautions that the unit should be used with adult supervision. Why chance it? Best to leave it on.

The lens assembly, in line with the sensors and offset right of center, is substantially recessed behind a clear protective cover. The cover itself is flush, somewhat untraditional for a front projector, where lenses typically protrude like the nose gun turret on a WWII bomber. A brushed aluminum panel spans the upper front two-thirds of the C, lending the projector a sophisticated, urban industrial look.

Like most UST console-style projectors, the UST PX1-Pro requires two hands to lift and move around due to its overall size and weight (about 20 pounds). The C1, on the other hand, weighs about half as much, which makes it easier to move.

I find the neo-industrial C1 to be visually contagious.Surprisingly light, its appearance nonethe-

less suggests a hand-hewn build quality instead of injection molding. When not operating, it defies description. A coworker, aware of my interest in shortwave radios, excitedly mistook the C1 for a restored Hallicrafters all-band communications receiver when he first saw thre C1.

FEATURES: IT'S HIP TO BE SQUARE

The C1 avoids accusations of imposter syndrome with its un-projector-like looks. The top is tastefully uncluttered with four identical buttons for power, play/pause, and volume up/down.

When off, the universal power symbol atop its namesake button is softly illuminated, extinguishing as the projector powers up. A benign but welcomed touch, it permits the lens to be the solitary source for light to exit the projector, which helps the C1 disappear in a darkened viewing environment. While the overall design delightedly eliminates my pet peeve of dprojectors that draw attention to themselves when placed within eyesight between the seating position and viewing surface, it introduces a caveat concerning the backlit Bluetooth remote control: Do not lose it. Usability is severely hampered sans remote, with the onboard physical doing little more than summoning power.

The remote has a finder feature that is accessed via a limited toggle menu linked to the main power button, which sets the remote to beeping when activated. The problem is, it's not very loud. Buried deep in a sofa, you may not hear it.

A selection of connections are neatly concealed behind a black plastic panel on the back of the projector.

The power input jack is on the left, launching the C1 to life via an external power pack instead of a direct connection to the grid, a testament to the efficiency honed into the newest generation of laser-based light engines. Even after 12 hours plus days, the power pack remained lukewarm at best.

Moving left, a Toslink digital audio output enables playback through an AVR or soundbar. Next is a wired LAN port plus a 3.5mm analog audio output jack for headphones or self-powered speakers.

There is a menu option to mute the onboard speakers when the jack is in use or enable both to play simultaneously, which is a nice touch when adding a powered subwoofer.

Inputs continue with a USB 2.0 port for external devices, and two HDMI connection. Input 2, supporting HDMI 2.1 with ALLM and supporting eARC capability, while Input 1 is HDMI 2.0 spec. An included extender accessory provides space past the cabinet housing; though the allotted area was sufficient for Bullet Train connectors.

The last available port is a USB 3.0, which is mentioned in the Quick Start Guide but not specifically in the electronic manual. You can plug a thumb drive into this USB port, and it will show up as "USB1" in the on-screen menu as an option to select.

Additionally, there's a round, black plastic piece on the right side of the device that seems to serve no clear purpose. It's probably there to reserve space for features in models sold outside of the United States.

Wi-Fi promptly connected the C1 to my network, remaining solidly locked on, and Apple AirPlay synced up to work flawlessly.

Hisense excluded a carrying handle, which is an odd omission for a portable projector. Though the unit is easy to tote, if your preteen Pop Warner running back is prone to fumbling, decides to host a backyard movie night.

SETUP: NO LAMP TO LIGHT

Hisense uses what it refers to as TriChroma Laser Technology, which bounces red, green, and blue laser beams off of a 0.47-inch Texas Instruments digital micromirror device, generating 1600 ANSI lumens to project diagonal images rbetween 65 and 300 inches. Pixels gyrate four times to reach 4K resolution at 60 Hz, and the E-manual indicates the C1's HDMI Enhanced format input can handle 4:4:4, 4:2:2, and 4:2:0, 10-bit or higher color spaces. I used a Murideo 8K Seven signal generator to confirm that the C1 accepts all color spaces, handling up to 16 bits per color.

The carefully curated lens will give Leica and Zeiss nightmares, effortlessly excavating image detail like an MRI with zero hint of chromatic aberration.

As a scribe reviewing consumer electronics devices, one must never presume. I suspect the light engine is a device made by the Chinese laser display specialist Appotronics.. The projector's specifications eerily align with those of other machines whose manufacturers openly admit a connection. Speculation aside, an ever-widening color gamut and very low light speckle (totally absent when sampled on a Stewart StudioTek 100 screen) are traits Appotronics' laser mechanisms are known for.

Partnered with a fixed screen, it takes a bit of experimentation to correctly position the C1 for vertical offset (the vertical delta between the edge of the viewing surface nearest the lens top).

For the best viewing experience, placing it at the height of a coffee table was ideal. The light projecting from just below the center of the screen was perfectly suited for pointing at my 100-inch Elite Aeon CLR reference screen. This allowed me to fully explore the Hisense AutoMagic Adjusting System's setup features. This impressive system includes a variety of automatic adjustments: Keystone Correction to straighten the image, Focus for clear visuals, Obstacle Avoidance to prevent image blockage, and Screen

At a Glance

- \+ Wide color gamut
- \+ Dolby Vision
- \+ Superb lens with state-of-the-art autofocus
- \+ Auto keystone correction
- \+ Comprehensive suite of non-global calibration controls
- \+ Stylish, conversation-starting design
- − Physical placement determines image size
- − Input lag is tolerable only for casual gaming
- − No carrying handle

Price: $1,799

www.hisense.com

HISENSE C1 RGB LASER MINI PROJECTOR

Test Bench

The Hisense C1 has every conceivable calibration parameter ever put on a wish list. Six-color CMS plus Flesh tone, with Hue, Saturation, and Brightness controls (x,y,Y). White balance adjustments are in 2-point and 20-point configurations. There are gamma presets from 1.8 through 2.6, including BT.1886. There is 20-point gamma adjustment capability, with ±25 input level gain control for fine-tuning response. Brightness, Contrast and Color Standard controls are also provided.

The range for the Sharpness control is 0-50, and ramping it up will introduce unwanted artifacts. Zero is fine.

Adaptive Contrast helps highlight image details in bright and dark areas. During the day on the Elite Aeon CLR, Medium indeed was the happy medium. For night viewing, Low worked best for me.

Choosing different motion control options, such as Smooth, Standard, Clear, Film, and Off, did not affect the fluidity of the image. I left it on Smooth.

Noise reduction settings include Off, Low, Medium, and High. Low was fine.

Color Temperature presets included Warm1, Warm2, Standard, and Cool. After the lasers had approximately 100 hours of run-in time, Warm2 produced the most natural palette combined with my pre-cal perceptual estimate.

The default Input lag was 149.8, dropping to 52.3 with Game Mode selected to On, measured using the Murideo 8K Seven generator. If *Gran Turismo 7* were real, and I was Max Verstappen, I would have lost my FIA Super License.

Laser speckle was extremely low, discernible only when inches from the Elite Aeon CLR. When the C1 was sampled out of curiosity on a Stewart StudioTek 100 screen, the speckle was totally absent.

While Hisense specifies it reaches 110% of BT.2020 color space, I measured 98.7% with my Minolta CS-200 using a Murideo Six G generator and Calman software.

DCI-P3 did net 100%, and the C1clocked Rec. 709 at 109%.

Pictured below are the pre- and post-cal passes on the Elite Aeon CLR, measurements taken with Portrait Displays Calman software.

Specs

DIMENSIONS: (inches) 9.7 x 7.1 x 8.5
WEIGHT: (pounds) 10.1
VIDEO INPUTS: HDMI 2 (1 x HDMI 2.0, 1 x HDMI 2.1, eARC, ALLM)
AUDIO: 3.5mm headphone analog-out, optical digital (Toslink).
USB: 2 (1 x 2.0, 1 x 3.0)

Adjustment for optimal display.

Autofocus was impressive, never failing to deliver an exacting, micro-detailed image to all points on the screen. Auto Keystone Correction did not have the repeatability I anticipated as depicted on the C1 website, appearing not to clear previous settings and instead attempting to rework previously taken samples. Similarly, automatic screen alignment did not map screen boundaries with alluded-to precision. However, allow me to frame this from a non-technical perspective. When these automatic functions complete their AutoMagic the menu immediately changes and offers manual adjustment for each parameter—should the results not meet expectations. In a few cantankerous reviewer seconds, size correction and focus were reined in with exemplary results. Patient consumers will discover this is easily manageable and rapidly become experts. Displaying a multi-burst pattern exhibited some moiré, but it was undetectable during normal viewing.

As for the auto screen alignment, the target demographic isn't likely to utilize multiple screens (save for homes you might see in luxury real estate magazines).

THROWING A CAVEAT OUT THERE

Owing to fixed throw ratios, UST projectors require unique placement accuracy to match the projected image to a static screen. While not a UST but rather designed for devil-may-care portability, I cannot see the C1 as being permanently mounted—though its performance should never rule that out. When the

projector's feet are removed, the remaining holes may accommodate a mounting bracket. Just know that if permanent installation is the objective, you will face limitations with the minimal range of some of the digital positioning functions.

When I attempted to adjust the size of the C1 projector image to fit different screens, I discovered that positioning the projector further back from the screen made it easier to adjust the image size. This is because the digital zoom feature is only usefuly for making the image smaller.

It may be possible for an experienced enthusiast to negate this by starting from scratch manually, but I did not want to revert to the projector's factory settings to attempt this.

CATCH MY DRIFT

I typically run a projector for an acclimation period of approximately 100 hours, to get a sense or which picture modes might provide a decent calibration starting point while making perceptual adjustments as a casual user might by eye. Doing so enables projector lamps to stabilize—or laser tracking in the case of the Hisense C1. Nothing new for laser-based projectors.

Following this acclimation period, it's clear how crucial it is for achieving optimal performance. This phase is where we fine-tune the projector based on real-world usage, much like what I observed during my time in Hollywood. There, I noted that even the most advanced laser projectors could exhibit signs of color instability.

During these pace laps for the C1, I reached for the remote more than a few times, changing from an initial Picture Mode setting of Warm 1 to Warm 2 and incrementally reducing red and blue offsets, arriving at -6 to green and -15 blue. A Low Blue Light mode turns off color temperature, white balance, and gamma controls. It is a decent-looking nighttime default setting with natural skin tones. If the tykes are watching cartoons before bedtime, this mode might be the ticket to ensure rapid snoozing, as the C1's measured operating noise level was only 37 dB.

The picture settings menu contains every control even the most obsessed calibrator could want (see Test Bench for details). And, fortunately, all C1 controls are easily accessed by pressing the home button on the remote.

The VIDAA Smart TV platform, which is a delight for even the most ardent streamer. It's more comprehensive than most and easy to navigate, even offering the ability to summon streaming apps via the remote's voice function.. However, it does omit Hulu and Max, but given their state of flux when the unit was on the drawing board, the omission may only be temporary. You can also call up streaming apps using the VIDAA voice features from the remote control.

LIGHTNING LIGHTING

I set aside time to begin the pre-calibration in earnest. My perceptual settings delivered white ice and realistic flesh tones. As it turns out, our Tampa Bay Lightning were home hosting the LA Kings. Hockey is a perfect broadcast video torture test, with rapid camera pans, wide-angle shots traversing pronounced diagonals, and moiré-inducing netting, all courtesy of the fastest team sport. Bally Sports lighting up a 2 Gig business fiber line provides image quality identical to what is coming from the broadcast truck (from my 19 years in NHL off-ice officiating).

The C1 handled every motion-related aspect of the image, as nothing visually distracted this hyper-picky observer from the acute fury of an overtime Bolts win.

Sound from the built-in 20-watt JBL speaker system was impressive as well, as it kept up with the Staying pace stride-for-stride with the onscreen intensity, steadily maintaining intelligibility with announcer voices while simultaneously flooding my room with arena ambiance, culminating with the Amalie airhorn bellowing with

you-are-there low-end authority as the winning goal stretched the net twine.

RED BULL GIVES YOU DINGS

JBL dispensed equal audio justice with *Gran Turismo 7*, fortunately drowning out unsavory game lag-related expletives as I struggled around Austria's Spielberg Red Bull Ring in a Sonic Gray Pearl '22 Honda Civic Type R (see Test Bench). Eye candy graphics from the PS5, laser-stitched in RGB by the C1, prompted an irreverent litany of liturgically related four-letter scurrilities from colleagues, each beginning with "Holy." Despite my Styrian Alps visit being visually riveting, the C1 was only acceptable for casual gaming; this is not a go-to machine for sleeves-rolled-up, bet-the-nest-egg contests.

DOLBY VISION IN THE HOUSE (OF MOUSE)

Believing image fidelity for the Hisense had peaked, I summoned *Elemental* in Dolby Vision on Disney+ through Apple TV, where the C1 proved spectacular. I was jolted by how the current boundaries of Dolby Vision are now pushed to their extremes. A scene that best exemplified this involves a makeshift pseudo-hot air balloon, fueled into drifting by fire element Ember's flaming locks, as she and H_20 element Wade search aloft for the source of a threatening impure water leak.

The Element City skyline is the backdrop as they glide slowly through the night sky. The segment represented one of the rare opportunities to experience and confirm first-hand, the contention that better pixels can replace glasses for convincing, 3D-like image depth. My 65" Sony OLED additionally augmented the depth dimension of this scene with its higher contrast ratio, but the C1 in no way disappoints in conveying artistic intent.

With Dolby Vision having the same white point as standard dynamic range, I carried most of the settings noted above over to the Dolby Vision Custom picture mode. Sublimely crafted Pixar pastels and wide-ranging inner hues gushed enchantingly from Hisense's TriChroma laser engine.

Coupled with the system's phenomenal optics and squeaky-clean video processing, the image was rendered with tangible layers of depth, like the eyes-closed soundstage audiophiles so often describe.

CONCLUSION

In the C1, Hisense has crafted a capable product that is easy to mistake for having the classy aesthetics of Bang & Olufsen. The unit performs magnificently with a quality screen like the Elite Aeon CLR. The Hisense C1 let me thoroughly enjoy all content unencumbered. Aimed at a random wall, it will also please, but that is akin to putting worn tires on a new Porsche 911 S/T.

Auto-image setup functions get you in the neighborhood, and the prompted fine-tuning aids enable even neophytes to dial in terrific viewing experiences intuitively. Take this as massive encouragement to acquire one, as unimagined uses beyond those intended will undoubtedly arise.

The Verdict

A quality 300" image from a grab-n-go projector? You'll have fun, fun, fun until daddy takes the C1 away! (Humblest apologies to Brian Wilson and Mike Love).

THE BEATLES' LAST SONG & REBIRTH OF RED AND BLUE

BY MATT HURWITZ

HOW DOES the most popular band in rock music history both close out their recording history and celebrate their iconic legacy at the same time? Well, in early November, The Beatles accomplished both, by releasing their last new recording, "Now and Then," and reissuing their ever popular catalog compilation albums, *The Beatles 1962-1966* and *The Beatles 1967-1970*—known informally as the "Red" and "Blue" albums (Apple/Capitol/UMe), augmented with dozens of new tracks and completely remixed in stereo. "Now and Then" was accompanied by both a 12-minute documentary about its creation, by filmmaker Oliver Murray, and a joyous and fun music video by director Peter Jackson.

The story of "Now and Then" goes back to 1977. As was his custom when songwriting, John Lennon would record a little demo for himself, likely on a boom box set atop or near

his piano. Such was the case with "Now and Then"—or, as it was known then, "I Miss You," as marked on the cassette handed to Paul in 1994. Its title was also known as "I Don't Want to Lose You," as seen on a lyric sheet.

A little more than 10 years later, in 1988, George Harrison was enjoying the success of the record made with some of his friends, The Traveling Wilburys. Sadly, one of its five members, Roy Orbison, passed away two months after its release. George revealed in a 1994 interview that he attended a party at Graceland not long after Roy's death. A discussion ensued about using Elvis's voice, from existing isolated recordings, as a possible way to continue the Wilbury's project. The idea was still on George's mind when he met up with Yoko in New York at the end of his trip.. When he brought the idea up to Yoko, she said, "Oh, I've got a tape of John's."

In January 1994, Paul brought that very idea up to Yoko, as well, asking if she indeed may have some recordings that might be available for he and the others to try to finish. Upon John's induction into the Rock and Roll Hall of Fame, on January 19, Yoko handed Paul a cassette with four such songs, copied from some of John's original work cassettes: "Free As a Bird," "Real Love," "Grow Old With Me"—and "I Miss You" ("Now and Then").

Within a month, Paul assembled his former bandmates, George and Ringo– as a possible way to continue the Wilbury's project. The idea was still on George's mind when he met up with Yoko in New York at the end of his trip. –to record at Paul's personal studio in Sussex, England: Hog Hill Mill (informally known simply as "The Mill"), along with (at George's suggestion) Lynne, who would co-produce.

Paul, who often still worked with former EMI/Beatles engineer Geoff Emerick, invited him to engineer the

1) John, perhaps around the time of writing of "Now and Then."
2) Co-engineer Jon Jacobs at work in Paul's studio, The Mill, in February 1995. 3) Arranger/programmer Marc Mann with producer Jeff Lynne.

Photos: Courtesy Marc Mann; © Apple Corps, Ltd.

sessions. Emerick, in turn, asked his former assistant on a number of 1980s McCartney projects—Jon Jacobs—to join him in engineering the recordings.

It was decided that of the four songs Yoko had provided, "Free As a Bird" would be recorded by the band. But before any recording could take place, John's cassette recording had to be transferred to 2-inch, 24-track tape. And it was not a simple matter. A person sitting alone at a piano and recording himself singing a song, without a drummer or a metronome, but just as a work tape, does so at a naturally uneven tempo. So the song had to be put to tape, as the basis of the full recording, in a way that overcame that limitation.

"All we had was the cassette," Jacobs states. "So what we did was, we chopped the whole recording into bits, recording each phrase of John's recording into a sampler. We created a click track on the tape, to have an even tempo as a base. Then, at the right point in time for each phrase, we would press the button and play that phrase onto the recording. It wastransposed by hand, one phrase at a time. So it was time consuming, and so fidgety. That was our learning curve."

One other big issue they faced was the presence on John's tape of his voice combined with his piano, from the simple monophonic recording. "If you wanted to raise John's voice level at any point," Jacobs explains, "it meant the piano would come up with it, and it would obliterate the rest of the instruments we were recording. And whenever John's voice appeared, there was background noise," hiss, etc., "depending on how loud he was playing the piano." Paul, then, came up with a solution. "The only way to fix it was for Paul to double-track John's lead vocal," doing his best John imitation.

With the approaching release of the three *The Beatles Anthology* CD sets, the plan was to feature one new Beatles song on each set: "Free As a Bird" on *Beatles Anthology 1*, and two others for the second and third albums. Two other songs were selected from Yoko's cassette: "Real Love" and "I Miss You" (henceforth, here, referred to as "Now and Then"). A new set of sessions would take place in February 1995 for the two additional songs. And again, Jeff Lynne was asked to co-produce.

By this time, though, recording technology had begun to advance, so Jeff involved someone whom he had been working with for a few years who was skilled with both arranging and programming, Marc Mann. Marc had also been working with composer Danny Elfman, and was always on top of new gear and new systems, something that could make working with John's cassette recordings go much smoother. So in late December 1994/early January 1995, the two got to work at a house Jeff was renting, while his now current home/studio was being completed.

Both "Real Love" and "Now and Then" suffered from the same flaws on the tape, so Marc was put to work repairing them. The two musicians were, themselves, most fond of "Real Love," which was the likely candidate for *Beatles Anthology 2*, so Marc's repair time was spent on that tune, with, hopefully, time remaining to apply the same fixes to "Now and Then," before Jeff had to fly to England to work on the sessions.

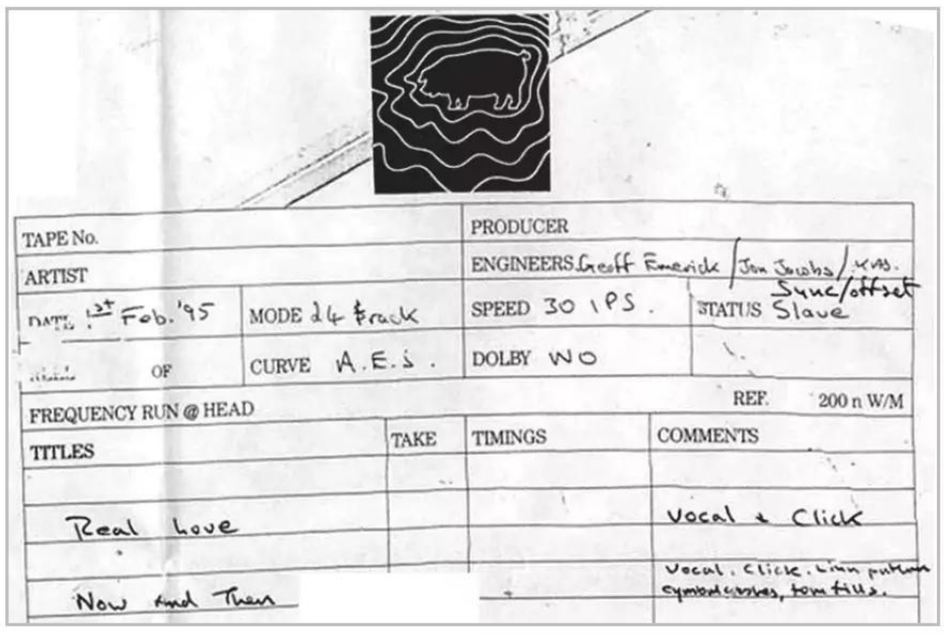
The main issues with the recordings were: hum, tape speed and low signal-to-noise ratio. There was a constant 60 Hz hum present on both songs, likely caused by grounding issues in the building or a fluorescent light nearby the recorder.

The speed of the recording was a bit fast, owing to the fact that not every cassette recorder operated at correct speed. "Not every cassette machine ran at the same speed," Marc notes. When the cassette was played on a tape deck from nearly 20 years later, it played at a slightly higher pitch. This affected all four songs on the tape.

Again, working on "Real Love," Marc first copied the recording into a digital workstation, in this case, Digidesign's Sound Designer II. Much like what Jon Jacobs described for "Free As a Bird," Marc then broke each and every musical phrase—both John's singing of lyrics (accompanied by his piano) and the piano segments between them—into dozens of individual files, each of which received its own treatment. He then used a variety of software applications to affect the different repairs.

Pitch correction, he notes, was also made worse by the fact that John's piano was slightly out of tune. He determined, later, that "Now and Then" was actually in A minor, though the tape played it in between B flat minor and A minor, which he corrected.

Once each phrase was corrected for noise and pitch, it was also time-stretched (where needed) to account for (again) the normal ebb and flow of tempo a person playing by himself will produce in a performance. A "rough mix" was then assembled, with each repaired phrase placed properly along a click track on the timeline, making a much cleaner read on "Real Love," compared with the original cassette.



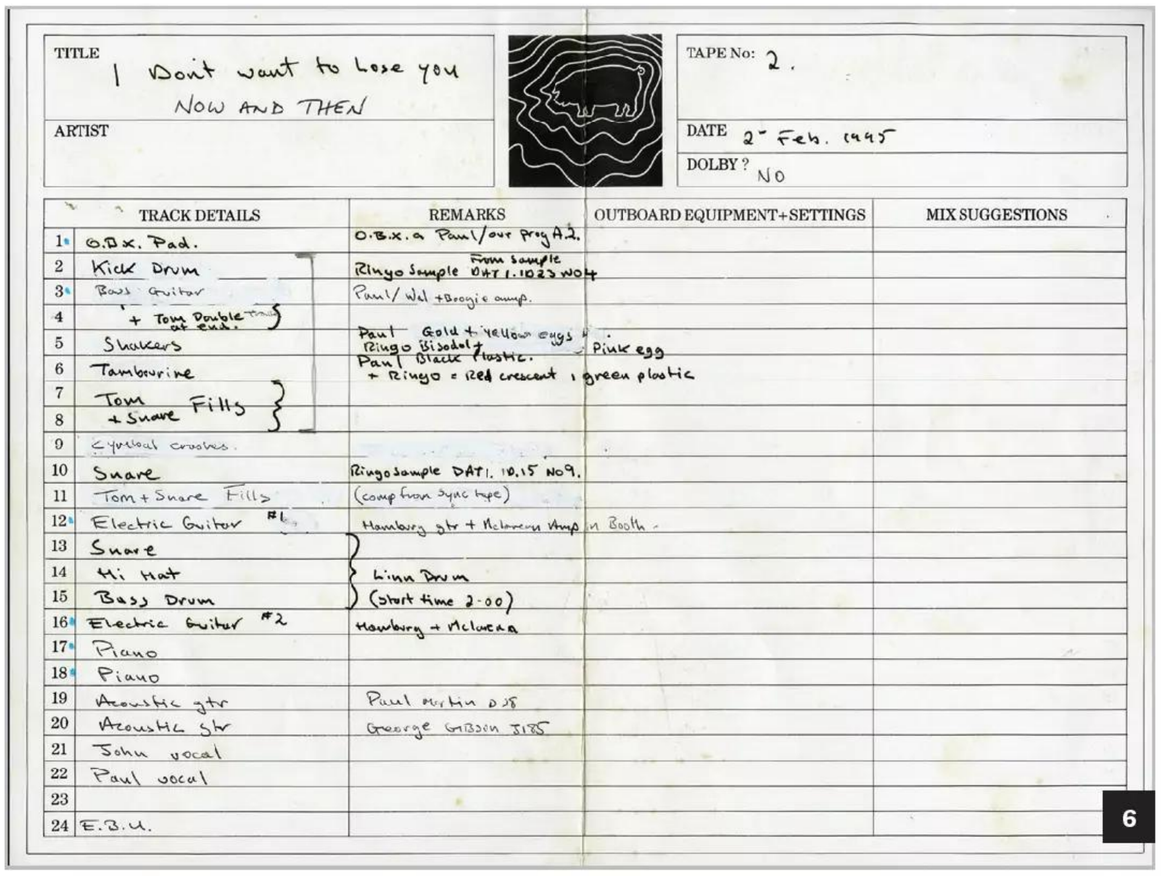
4) Tape box and track sheet from the first day of work on "Now and Then," from Feb. 1, 1995. John's vocals from the two tracks —which were expected to be worked on, "Now and Then" and "Real Love,"—had been transferred from the materials provided by Jeff Lynne. Click tracks were added to each, and a Linn Drum Machine's drum track sounds were placed, as were some additional live fills by Ringo].

Jeff and Marc then created a mockup of the song, based on John's recording, with Marc playing keyboards, Jeff playing bass, and both playing acoustic guitars—"really, to convince Paul, George and Ringo that this was doable, and that it should be done," Marc explains.

The prepped "Real Love" material was transferred to a two-inch, 24-track tape which Jeff brought with him to England. The tape had Marc's click track, John's cleaned up and timed vocal, guide piano, guitars, bass and drums. A rough mix was made to a half-inch tape, and to cassette, for Jeff to listen to on the plane (and easily share with the lads).

With the main focus being "Real Love," nearly all of the prep time was spent getting the song to that point, leaving just one day for Marc to do whatever he could to "Now and Then." He had, by that point, done the identical steps that he had done on "Real Love," of breaking the musical phrases apart—vocal + piano and piano—and setting them on an even tempo. A DAT tape was prepared on a Panasonic DAT recorder, with the vocal + piano on one channel and the piano phrases on the

5



TITLE: I Don't want to Lose You / NOW AND THEN
ARTIST:
TAPE No: 2.
DATE 2nd Feb. 1995
DOLBY? NO

	TRACK DETAILS	REMARKS	OUTBOARD EQUIPMENT+SETTINGS	MIX SUGGESTIONS
1	O.B.x. Pad.	O.B.x. a Paul/our prog A.2.		
2	Kick Drum	Ringo Sample From sample DAT 1. 10.23 No4		
3	Bass Guitar	Paul/ Wal + Boogie amp.		
4	+ Tom Double Track at end.			
5	Shakers	Paul Gold + Yellow eggs. Ringo Bisodol. Paul Black Plastic. + Ringo = red crescent, green plastic	Pink egg	
6	Tambourine			
7	Tom + Snare Fills			
8				
9	Cymbal crashes.			
10	Snare	Ringo sample DAT 1. 10.15 No9.		
11	Tom + Snare Fills	(comp from sync tape)		
12	Electric Guitar #1	Hamburg gtr + Melbourne Amp in Booth -		
13	Snare	Linn Drum (start time 2-00)		
14	Hi hat			
15	Bass Drum			
16	Electric Guitar #2	Hamburg + Melbourne		
17	Piano			
18	Piano			
19	Acoustic gtr	Paul martin D 28		
20	Acoustic Gtr	George GIBSON J185		
21	John vocal			
22	Paul vocal			
23				
24	E.B.U.			

6

5) Ringo at his kit, rehearsing a drum part, during sessions at The Mill, February 1995. 6) Track sheet from the Feb 2, 1995 "master reel" for "Now and Then," written by engineering assistant Keith Smith. 7) Paul and George record their acoustic guitar parts at Paul's studio, The Mill, February 1995.

other, with a lead-in of click track, just before the music begins. "But Jeff had to get on a plane the next day," Marc recalls, leaving him no time to do any of the other complex, time-consuming steps detailed above. That would prove unfortunate.

1995 Recording

Upon his arrival on Wednesday, February 1, Jeff handed those materials and the original cassette to one of The Mill's engineering assistants, Keith Smith or Eddie Klein, the latter an Abbey Road veteran who built studios for John and George, as well. "The first thing that would have happened would have been Eddie or Keith logging in the cassette, and then one of them copied the DAT over to 2-inch tape," Jon Jacobs explains. "At the time," he explains, "Paul didn't have Pro Tools. It was still in its infancy. Paul had two beautiful Studer A800 two-inch, 24-track tape machines, and that's how he made all his records."

Steve Orchard, Paul's in-house engineer at The Mill, detailed the process on the track sheet for that day. Keith transferred the vocal track of 'Real Love,' which included the piano mix, to Track 5 of the 24-track recording tape. This transfer also included a click track lead-in for timing. A similar procedure was followed for 'Now and Then,' with its transfer to Track 3. Then, using the click track lead-ins of each as a tempo guide, he added new click tracks for each (onto Track 9 for "Real Love" and Track 14 for "Now and Then").

The following day—Thursday, February 2—the team decided to begin tackling "Now and Then." The group used John's arrangement of "Now and Then" as it stood, which Marc Mann notes, "Some of it, he hadn't even finished the words. He was coming up with the words, interpolating. And you can still hear a hint of that in the new release, where they repeated some lines, and they had had other words there." But it did keep the unused "B" sections (following verses), which do not appear in the final version.

A second 2-inch reel of tape was created that day using an Ampex 499, running at 30 ips, as had become the standard in studios by then. The new reel was used as the master, with the reel from the day before (the "slave" reel in recording parlance of the day) synced together via SMPTE timecode, allowing the two reels to play/record together, so that items from Reel 1 could be heard, as well as easily copied, as desired, onto the master reel.

Curiously, though Ringo is seen in footage in Peter Jackson's music video playing on his full 1989 Ludwig Silver Sparkle kit completely miked, that is not what actually occurred during tracking.

For "Now and Then," he was not recorded in the manner Jeff Lynne normally prefers to record drums, as he would do for "Real Love." For the latter, Jon Jacobs describes, "We didn't record it as a drum kit, as such, but recorded the kick and the snare separately, due to the acoustics Jeff was after. For the snare, we moved it into the kitchen, so we could get an ambient sound, because the studio itself is kind of a dead area." Ringo also performed some tom tom fills in the barn.

The drums captured for "Now and Then" were far different, Steve Orchard notes. For that song, a Linn Drum Machine, a popular electronic drum sequencer, was programmed to play the drum part—snare, kick drum and hi-hat—likely played by Jeff himself. The output of the Linn machine was

7

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recorded onto Tracks 15, 16 and 17 of the source reel, on February 1.

Samples of Ringo hitting his snare, kick drum and hi-hat were then recorded onto a DAT tape, and those were then recorded into an AMS Digital Delay and Sampler. The following day, those samples triggered by playback of the Linn drum machine sounds were subsequently recorded onto tracks on the master reel. But on February 1, it was just the Linn sounds with some additional cymbal and tom tom fills for "Now and Then," along with tom and snare fills for "Real Love," that Ringo transposed onto the slave reel.

On February 2, items from the slave reel were copied over to the master reel: the three Linn drum machine tracks (which were also used in place of a click track, for time keeping), John's vocal, and Ringo's tom and cymbal fills (the latter mixed together onto a single track). The Ringo drum samples, of his kick drum and snare, triggered by the Linn tracks, were then recorded onto Tracks 2 and 10, respectively, this day.

Hi-hat samples, recorded onto Track 3, appear to have gone unused, recorded over by Paul, recording his Wal bass, through a Boogie amp, onto that track (the Wal, with its additional lower 5th string, allowing Paul to compensate for the tuning/pitch issue).

Paul recorded a synth "pad," played on an Oberheim B-X, onto Track 1. "That was a favorite of Jeff Lynne's," Steve describes. "The pad he played was a sound that's hybrid of, say, a Fender Rhodes electric piano and a string sound, without much attack, kind of used to gel all the sounds together, like a glue." The part, ultimately, was not used in the final, released mix.

As seen in the music video footage, Paul and George first recorded a pair of acoustic guitars—Paul on a Martin D28, George playing his Gibson J-185—onto Tracks 19 and 20. The two are using capos on the first frets of their guitars, to account for the fact that the speed and pitch of John's vocal hadn't yet been corrected by Marc Mann, as he had been able to do for "Real Love." Each was recorded onto his own track.

George also recorded two separate tracks of electric guitar, onto tracks 12 and 16, both played on what is identified by Keith Smith on the track sheet as "Hamburg gtr," through a "McLaren amp," both George and amp sitting in the control room, recording the parts.

Paul replaced John's piano with a new piano part, recorded in stereo onto Tracks 17 and 18 (though Marc notes the original idea was for John's to remain, with Paul simply bolstering it with a new track). And Paul recorded his John-doubling vocal during this time onto Track 22, as he had done on "Free As a Bird."

8) George and Paul listen to playback in the control room of The Mill, February 1995. 9) Tape box label for the first true day of band work on "Now and Then," Feb. 2, 1995. 10) Longtime staff engineers at Paul's studio, Hog Hill Mill, Keith Smith (left) and Steve Orchard (right) with Paul. 11) George tracking his acoustic guitar part for "Now and Then" at The Mill, February 1995.

Ringo recorded some additional tom and snare fills, onto Tracks 7 and 8, and cymbal crashes onto Track 9. And Ringo and Paul, together, recorded onto Track 5—an assortment of shakers in Paul's collection—identified by their color on the track sheet, along with some tambourines.

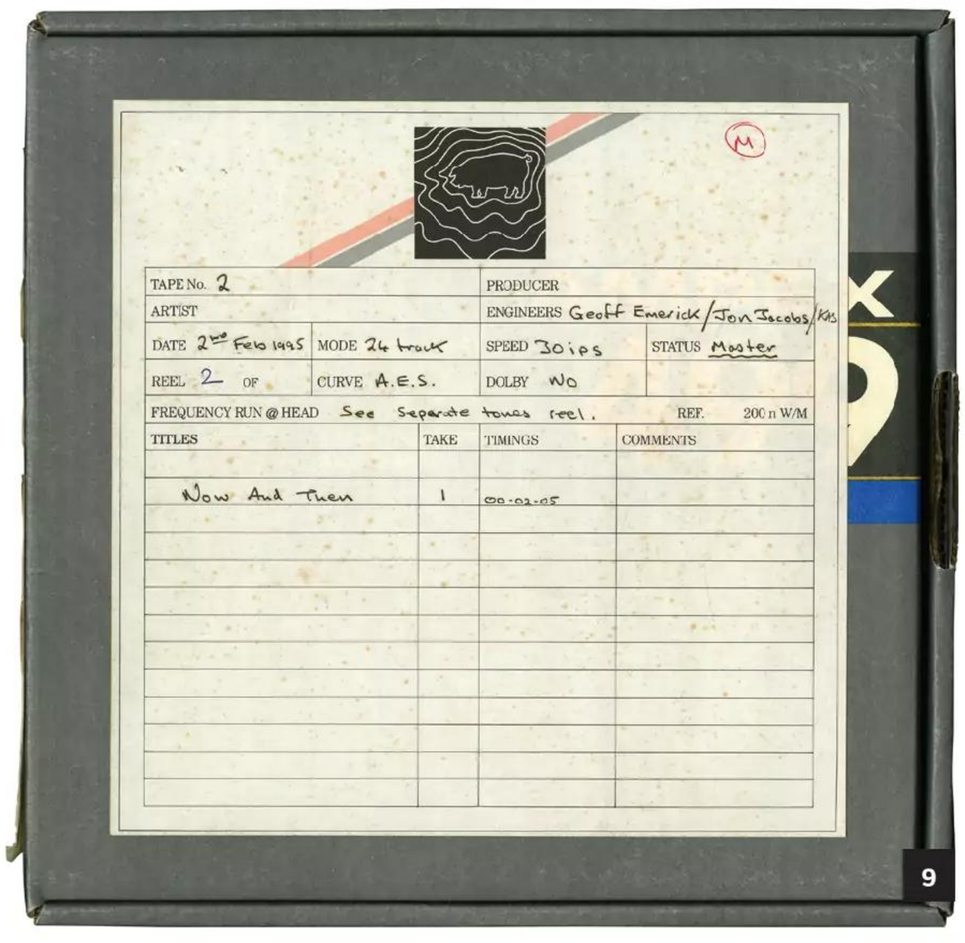
Even with all of this work as a start, it was soon determined that the quality of John's vocal for "Now and Then" left a lot to be desired. They decided to abandon the song in favor of "Real Love." "'Now and Then' was the first thing we looked at," Jon Jacobs recalls. "But we probably only played around with it for a day, maybe two days. We might have had a go at it, but we didn't spend long on it. We started it, and then quickly moved on to 'Real Love.'" Steve Orchard notes that the earliest date indicated on the reel tape box for "Real Love" was the following Friday, February 10. Given Jon's recollection of jumping in on "Real Love" immediately upon giving up on "Now and Then" after a day or two's work leaves what happened over the following week still a mystery—whether there was additional work done or that the group took a week's break before beginning "Real Love" on the 10th.

George was especially vocal about not wanting to continue work on "Now and Then" due to the audio quality issues. "It's so regrettable that we didn't get to complete the prep work on it"—noise reduction, hiss removal and cleanup—"before it was presented, as we were able to do for 'Real Love,'" Marc Mann says. "It was presented prematurely, and George's reaction to it may have been better had we had a chance to do that."

The following year, though, in April 1996, Jeff was notified that, in preparation for the release of *Beatles Anthology 3* later that year, the Fabs wanted to go ahead and give "Now and Then" another try. So he was asked to prep the song properly.

Jeff, by this time, had moved into his new house, with a fully-operational studio. Marc dove in, working his tedious restoration process all month, the same as he had done with "Real Love," again breaking the song into vocal and piano phrases and working his magic on each.

"Then, around the end of the month



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or beginning of May, Jeff came in and just said, 'Paul just called. We're not doing it.'" Even without having heard the new work Jeff and Marc were busy creating, the band decided to just drop the whole idea—again, thinking it was not in a usable condition to make a recording.

A Second Life

The recording was never far from mind for Paul. It was always something he knew he wanted to complete, but until much later, the technology simply wasn't there to do it.

Engineer Steve Orchard, who'd started in the tape era in 1986, had first worked with Paul on orchestral sessions for his 2007 album, *Memory Almost Full*, as well as some tracking and mixing sessions at The Mill. Keith Smith and Eddie Klein had both been at the studio for a number of years, but were skilled mostly in analog recording, so with the arrival of digital technologies, Steve was asked by Paul in 2013 to help out full time.

Over the years, Paul would ask Steve to pull the "Now and Then" tape/hard drive "out of the cupboard" to refresh his thoughts about the recording. "We didn't really do anything conclusive. It was just kind of going through, exploring the arrangement, things like that" Steve explains. The two would work on the recording sporadically, in between different projects.

Eventually, in February 2021, Paul decided to take working on the song seriously, not long after the release of *McCartney III*.

The tape, at that time, still contained the original vocal transfer from Marc Mann's DAT tape from 1995, which had none of Marc's restoration work, done the following year. It still had Paul and George's acoustic guitars, George's electric rhythm guitar, Paul's bass, piano and vocal, the Linn Drum tracks, the drum sample parts and Ringo's fills—and, of course, John's original piano from Marc's DAT.

"The piano was just so mushy, it was just not usable. And the vocal—although they tried to clean it up with what they had at the time in 1995, it just wasn't really great. We tried some things, like Rx Isotope, which has a great music rebalance tool, to try and clean it up. It was slightly better, but it was still mushy and distorted, and didn't sound good. Certainly not anywhere near what we ended up with."

Another concern was speed correction—which meant pitch correction—since Marc Mann hadn't had the opportunity to address before the DAT was sent over. So on Monday, February 1, as work began in earnest—26 years to the day that work had first begun on the song—Paul and his engineer used Waves Soundshifter to lower the pitch down half a step. "Once that happened, and he transposed it all down a semitone, it locked right in and felt right. It changed the whole feel of everything, really."

That day, the two also made a significant change to the arrangement. Paul decided to cut out the "B" sections within the song (which can be heard on bootlegs of the original recording). "It was a cool section, but it wasn't resonating with him," Orchard recalls. "He was saying that John was almost fishing for chords there. And he said that, back in the day, when they were writing together, if there was a section in the song that Paul had written that John didn't like, or vice versa, they would take it out."

The following day, on February 2, Paul decided, in George's absence and in his honor, to add a slide guitar solo. The solo was played in a section of the song John apparently had written/left for such a solo.

The solo was played on a vintage 1960s (or earlier) Rickenbacker lap steel guitar. "He's had it for years—I think Linda had gotten it for him. It's beautiful." The guitar was played through Paul's vintage Vox AC30 guitar amp. "Then, we gave it a bunch of treatments," including re-amping and putting the signal through a variety of pedals, as well as a vintage delay device, a Binson Echorec.

Paul also added a Baldwin electric harpsichord—the very one used on "Because" in 1969 on *Abbey Road*, which Paul obtained from the studio, at some point—run through a Leslie cabinet for effect.

A few months passed before Paul returned to the recording. On Friday, July 9, Paul replaced his original bass track, this time using his classic Hofner instead of his 5-string Wal (used in 1995) to account for the pitch issue. Paul later changed a few bars here and there, when other parts would arrive back (strings, drums).

Paul's decades of experience crafting perfect background vocal parts were put to work on Monday, July 12, when he added his harmony vocal to John's main vocal and

12

double-tracked vocals in the choruses, the latter to simply reinforce.

Paul's count-in, heard at the beginning of the song, is from the original 1995 session. The talking at the end, Steve informs, is George, saying something slightly off mic. "It's just part of the whole experience, them bringing all of their magic together."

Enter MAL

As the end of 2021 rolled around, and Peter Jackson's *The Beatles: Get Back* was completed and premiered, Paul was still not satisfied with the quality of the sound of John's voice from the cassette—and unable to separate it from the piano. He found himself quite impressed with Jackson's Park Road Post Productions team's ability to use an in-house-designed Machine Assisted Learning system—nicknamed "MAL"—to separate Beatle dialogue from musical instruments playing in the background for the film. So in early February 2022, he asked the company's Head of Machine Learning, Emile de la Rey, to see if he could do anything to improve John's vocal using the system.

Emile had already begun improving the system for use in separating instruments of single-channel rhythm tracks on 4-track session tapes for *Revolver*—for that album's remixing project, which was underway. The system masks out unwanted sounds, like John's piano, leaving only the target sound, such as John's vocal. "It's crucial to understand that these models don't actually generate anything fundamentally new from the original audio," the engineer explains.

He received the initial digitization of the cassette Yoko had given Paul (as mentioned, in early February) first cleaning the noise from the recording, and then isolating John's voice from the piano. The system did the best that it could at the time—still a massive improvement—which was sent back to Paul on February 21 and inserted into the recording by Steve Orchard at The Mill, replacing the original transfer from 1995.

Paul now had a good start on finishing the song, but wanted another producer's input. Though Paul had first approached Jeff Lynne about the project, Jeff declined. So he asked another frequent collaborator, Giles Martin, son of legendary Beatles producer Sir George Martin.

Giles had been working on a Dolby Atmos mix of Wings' 1973 LP, *Red Rose Speedway,* and he had invited Paul to Abbey Road to come have a listen. So, on Monday, March 7, Paul dropped in, but he brought a surprise of his own. "He played me the track and wanted to know what my thoughts were about it," the producer notes. "I was really touched by it." Paul then asked if he might like to get involved and what he thought. "I told him, 'I think it should sound a bit more Beatles.'"

Paul wanted to know in what ways. Giles explained that Ringo's drum sounds—the samples driven by the Linn Drum Machine—didn't sound enough like Ringo. And perhaps there should be strings. "And I said, 'And I'll try and put some backing vocals on it.' And Paul went, 'Whoa! Easy. . . Let's not try and be corny here, or try and force the issue.'" They then agreed to just try things, and see how it went.

There were a few things the two decided to remove from the existing session. Firstly, there had been a synth "pad" added, at some point, playing a background rhythm, which seemed unnecessary with the addition of true strings.

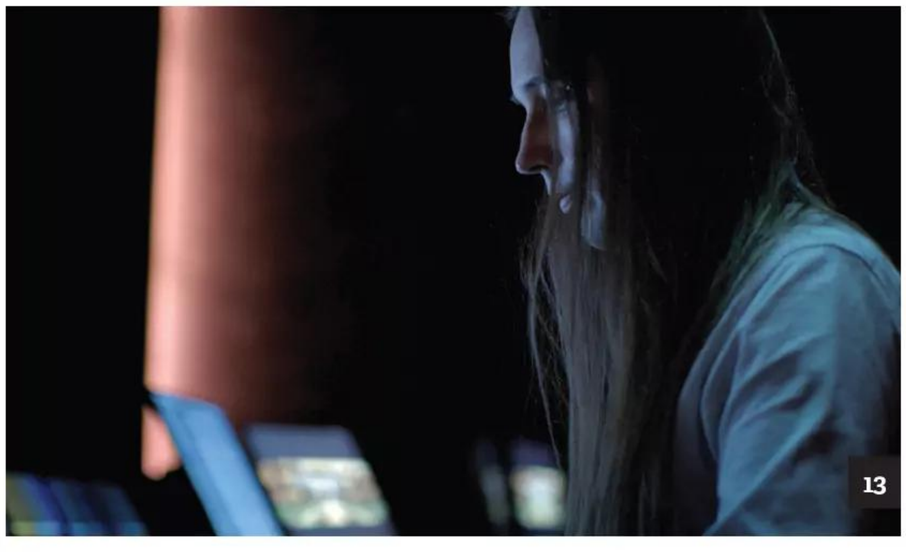
Regarding Ringo's drums and the Linn sounds, Giles opted to abandon Jeff's original approach and record Ringo anew, live.

So Giles sent Bruce Sugar—Ringo's own in-house engineer at his Rockabella West studio, located in his Beverly Hills home—the complete Pro Tools session for the song, as it stood, onto which he recorded Ringo's new drum part on Sunday, April 9.

"That original track from '95 was stiff," observes Bruce. "It didn't swing, like Ringo normally does. He listened to the song a few times, to assimilate it, and then put down what he thought was the best... His instincts are so great." The two also recorded Ringo's vocal, heard in the chorus, alongside Paul's, that day.

Capitol Studios staff engineer Steve Genewick had worked previously with Paul a few times, most notably assisting the legendary Al Schmitt on his sessions there for his 2014 album,

12) Paul recreating adding his bass line at The Mill, for the cameras of documentary director Oliver Murray, May 19, 2023. 13) Park Road Post's machine learning wizard, Emile de la Rey. Emile not only led the team extracting and revitalizing John's vocal for "Now and Then," but also all of the Red and Blue album source separations. 14) Co-producer Giles Martin. 15) Ringo recording his new drum part for "Now and Then" at his home studio, Roccabella West, in Beverly Hills, on April 9, 2022. 16) Steve Genewick's copy of the "Now and Then" score sheet with a false title. To keep the project a secret. They were told the session was simply for a Paul McCartney project. 17) Arranger Ben Foster conducts the string session for "Now and Then" at Capitol Studios, May 1, 2022



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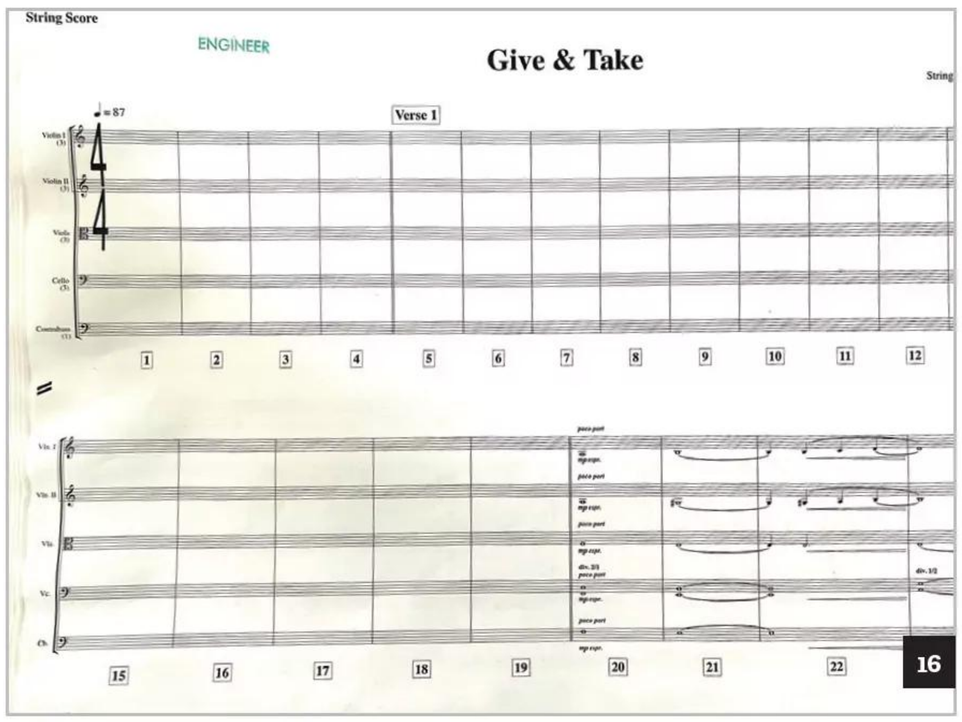

16

17

Kisses on the Bottom. So when word came that he and his assistant, Chandler Harrod, would be recording strings for, as they were told, a Paul recording, produced by Giles, he was plenty excited. "We figured Paul's got a song for a movie or something, who knows. A one-off song is not unusual," the engineer recalls.

The plan: Giles would drop off the session drive on Friday night, April 29 and Paul would come in on Saturday, April 30. The string session itself was scheduled for the following day, Sunday, May 1. When Genewick arrived Saturday morning, he found a surprised Chandler, who played him the recording. He quickly realized the voice on the tape was not Paul, but John. When Giles arrived, he found the two smiling faces, Steve exclaiming, "'Nobody told me we were doing a Beatles song!' He said, 'Yeah, we don't let it get around that much.'" Then Paul arrived.

Genewick and Chandler spent that morning setting up mics for Sunday's session in Studio A, the large studio, while Paul went through the arrangement in the control room with arranger Ben Foster, a colleague of Giles's with whom he had worked many times before. "Ben had his laptop and had a mockup of the string arrangement, which they went through together. Paul would ask, 'Oh, can you put that there?'—a run here or there, or a chord here or there that he wanted changed. Nothing major," as he might have done with Giles's father 50 years earlier.

"I played him the arrangement," says Giles, "and one thing that was really important to him was George's rhythm guitar part. He said, 'Listen, George's rhythm guitar is really important, and we need to make sure that we're respecting that.' And he was absolutely right," prompting changes here or there to make sure it wasn't obscured by any string phrasing.

The team was offered one other treat that day. "Giles was playing back the new *Revolver* mixes for Paul," Genewick remembers fondly. "We had the Pro Tools sessions, so we could solo the tracks and listen to it. And I have to say, listening to *Revolver* with Paul was quite a lot of fun."

On Sunday—the day of the session—the players arrived as scheduled, Paul having gotten there even before they arrived. The string section was fairly small: six violins, three violas, three celli and a bass, which Steve arranged and miked like a traditional orchestra with violins towards the left, violas in the center, the celli to the right, and the bass in the middle.

The players were told nothing more than that they were working a Paul McCartney session. "The score sheets actually had a different title on them—'Give & Take'—with no artist listed," Steve states, holding his copy of the score. "It just said, 'Strings arranged by Paul McCartney, Giles Martin and Ben Foster.'" The players' headphone mix had no vocals, which, Steve notes, is not unusual.

Paul spent much of the session in the studio, working with the musicians. "He was very positive, encouraging. Not a lot of notes given in the session," Steve recalls. Though the players were told by the contractor not to take any pictures, Paul, of course, was fine. "He was out there, taking selfies with anyone who wanted one," even posing for a group shot with the entire group of musicians.

As Giles had promised Paul, following the string session, he did insert some background vocals, heard mostly during the song's choruses. And as he had done before, for the creation of LOVE by Cirque du Soleil, Giles used background vocals from actual Beatles recordings—in this case, from "Here, There and Everywhere," "Eleanor Rigby" and "Because." The classic recordings made a good mix, complementing the background harmonies Paul had already recently recorded.

Not long after, over a few days in June, the song was given its first—and, at the time, assumed, only—mix, by mixer Spike Stent (Ed Sheeran, Harry Styles and The Foo Fighters), at Windmill Lane in Dublin Ireland. The experienced mixer and Giles are close friends and have worked together for several years.

Spike's goal was to make the track as authentic as possible. "The thing about The Beatles was, they touched us all. So it's very easy to make records sound too slick, modern and bright today, keeping an eye on the journey the song takes us through was paramount, "while still making sure it's relatable to this day. And that's quite a difficult balance."

Beatles records, too, never had parts fighting for prominence. George's solos, like Paul's here, always had their place. "Whenever there was a solo, it took front and center," he explains. Ringo's drum sounds, too, he notes, "were genius. His playing always left room for all the other instruments. He was very clever in that."

And in case you're trying to figure out who is who on the acoustic rhythm guitars, that's Paul to the left, George to the right.

Spike's first pass at a mix, of course, utilized Emile's February MAL-repaired vocal, one which he took steps on his end to attempt further fixes, with whatever technology he had on hand.

The original plan was to release "Now and Then" in October 2022, to celebrate the 60th anniversary of The Beatles' first single "Love Me Do" together with their last. The vocal wasn't up to the quality Giles and Paul were looking for, so a new digitization of that cassette recording was made and sent to Emile in October for another pass.

But the quality was still problematic, so an even greater effort was made to see if the true original master tape could be found, which it was, offering the engineer what he needed to give us what we hear today. "It was a superb transfer of the original cassette, with no previous processing or editorial work done," he states. "I was able to successfully isolate a full and coherent vocal signal."

Spike did a new mix with the new vocal in January 2023 at his own studio, SLS Studios UK, with one final pass coming on July 4th. "Having it properly clean meant we didn't have to hide anything," says Giles. "The first thing you're drawn to on a record is the voice—it's the first thing you recognize. It enabled us to make sure it was a John song and a Beatles song. I wanted to make sure it was Beatles, undiluted—that when you heard the track, you think, 'Well, this is The Beatles.' Cause it is The Beatles."

18) Paul listens to the musicians' playing inside Capitol Studio A, during string session, May 1, 2022. 19) Paul happily poses with the string players after the May 1, 2022 string session for "Now and Then." Engineer Steve Genewick is seen, second from left, while his assistant, Chandler Harrod is 3rd from right, back row.

The *Red* and The *Blue*

Since their release in April 1973, *The Beatles 1962-1966* and *The Beatles 1967-1970* (commonly referred to as "The *Red* Album" and "The *Blue* Album," due to their sleeve colors) have not only been the way many fans would enjoy their favorite tunes from the catalog, but the way many new fans found their way into The Beatles. Even fans who owned few or none of the group's original LPs owned these sets.

In late 2022, Apple was trying to find an appropriate album on which to place the new track, "Now and Then." After the deluxe remixed *Revolver* was issued in late October that year, fans began hoping that *Rubber Soul* would be the next such release. "The question was, how do you celebrate 'Now and Then?'" explains Giles Martin. "You can't put that on *Rubber Soul*."

Apple and Universal, then, began thinking about creating a new compilation album, titled *Now and Then,* loosely based on a list of what the most popular Beatles songs were in the streaming world. But after some discussion, it was decided to abandon that idea and go with a tried and true, existing compilation—the *Red* and *Blue*. And to make the reissue even more special, all of the tracks on the two sets would be remixed by Giles and his engineer, Sam Okell, with whom he had remixed the Beatles catalog albums (*Revolver* and later). The sets would also be augmented to include additional tracks, to reflect some of those songs now popular to fans via streaming, and others.

The albums' history appears to stem mostly from a reaction by AKBCO (the company owned by Allen Klein, who had signed on to manage Apple in 1969) to an unauthorized bootleg collection of Beatles hits being marketed on television, called *Alpha Omega,* according to historian Kevin Howlett, a member of the team who helped create the current lot of excellent Beatles reissue sets (and writes their liner notes). Once Klein learned of the album, in February 1973, he sued. By the time the suit settled, the *Alpha Omega* was proof to Klein that there was a demand for such a collection. So he had his right hand man, Allen Steckler, assemble a track list for what would become a pair of two-disc albums, spanning The Beatles' touring years (*Red*) and studio years *(Blue*).

Its sleeve was designed by the great Tom Wilkes, known already for his designs for George's *All Things Must Pass, The Concert for Bangladesh,* and his then-upcoming *Living in the Material World*. Its front and back covers consisted of outtake images from cover shoots for both their first LP, *Please Please Me,* from 1963, and the original design for their unused 1969 *Get Back* album, which recreated, with the exact poses, the look of the 1963 image, even shooting at the same location (EMI's Manchester Square office building) and using the same photographer, Angus McBean. The inner spread image of the gatefold sleeve was taken in 1968, outside St. Pancras Church in London.

And the red and blue "color coding"—"That's a stroke of genius," says Howlett. "Those colors, for whatever reason, just seem appropriate to the two eras. And everyone began calling them the 'Red' and 'Blue' albums, all on their own, just the way everybody refers to their 1968 double-LP, *The Beatles,* as *The White Album*."

While the original sets had 26 and 28 tracks, respectively, the 2023 releases contain an additional 12 and 9 songs, respectively, above the original tune stacks.

Says Giles, "As Beatles compilations go, a lot of the material on the original albums isn't really reflective of what's popular today, what people listen to most on streaming. Things like 'Blackbird' that's not on any other compilation, but it's a really popular Beatles

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track. I was in the car with my daughter today, in fact, and she was playing it."

Interestingly, the running orders on the CD and LP reissues, released on Friday November 10, 2023, differ. The CDs insert the added tracks in the correct chronological order, while the LPs leave the original running orders intact on the main two discs, adding a third disc for the added material (including "Now and Then," which opens the third *Blue* LP). "The feeling was you're buying the vinyl to recreate the original experience of what those albums were like. It's just a different approach," explains Kevin.

Remixing with New Separation

It was during the *Revolver* project that Giles and Sam Okell, his engineer, got a sense of what was possible by utilizing Park Road Post's MAL system for separating instruments which were originally recorded and mixed to a single track on a multitrack tape. "In early 2022," recalls Emile de la Rey, "I established a workflow with Giles and Sam that was suitable for the evolving nature of MAL—which boiled down to providing them whatever separations I could manage to achieve!" In their initial meetings, "We settled on some fundamentals, what to prioritize," including what individual drum kit components could be separated, once the drum kit itself was pulled out of the rhythm track.

He and his assistant took the time to map out every single instrument on each track of the multitrack tape (four-track tape, in this case), crossing them off, one by one, as he used the system to pull them out. "And as I encountered new types of instruments, I would train our foundational source separation models to deal with those instruments," eventually picking apart the entire album's recordings. Notes Sam, "Emile had done such good work on *Get Back* and the *Revolver* mixes, we now had a template for how to use this technology to make good remixes. We had a pretty good process."

For the much larger number of tracks requiring separation for the *Red* and *Blue* albums—and mostly the *Red*, since the *Blue* generally consisted of mixes already recently created for the deluxe/anniversary editions of those source albums—Emile assembled a much larger team, who, once again, mapped out all of the existing instruments of each channel of each track.

He then put the system to work. "We then tried to see just how far we could push the platform," Emile informs.

"Ideally, you want everything separated out, to give you as much flexibility in the mix as possible," explains Giles. "But there are limitations, depending on the compression on the original recordings, and how dense they are." Rhythm tracks on Beatles recordings typically had—on a single track—drums, bass, rhythm guitar (sometimes two). "And Emile would often then further separate the drums into kick, snare, toms and cymbals," says Sam. "So that's seven elements coming out of one mono track."

The application of that approach to recordings made in 1962 and 1963 are even more remarkable. Prior to October 1963, at the end of the recording of *With The Beatles*, when four-track tape machines arrived, recordings at Abbey Road were made on what was referred to as "Twin-track." Engineer Norman Smith would typically record the rhythm track instruments onto Track 1 of the tape, while the vocals—sung live—were placed on Track 2.

"The Twin-track recordings tend to have rhythm with vocal reverbs on Track 1," Emile explains. "It was slightly tricky reaching a consistent vocal reverb isolation, parts of which tended to get lost to the cymbals. But we managed to get there. The full vocal signals on Track 2 tended to duck the other elements, such as guitars, quite heavily," owing to the compression the strong vocal signals would initiate on the other track.

And if that's not remarkable enough, there are two songs in the catalog for which no Twin-track master still exists—their very first single, "Love Me Do," recorded in September 1962, and their fourth, "She Loves You," recorded the following July. Without a Twin-track tape to mix from, those songs have never been released in true stereo—until now.

For drums, Giles explains, "When we started on *Revolver*, I said, 'Emile, now you've given me a clean drum track. Can you now demix the demix? Can I now have kick drum, snare drum, toms, hi-hat?'" But, as Emile notes, whether the initial format was mono, Twin-track or four-track, the path to isolating the individual drum components tended to be consistently achievable, "with great isolation of the kick, snare, toms, cymbals and percussion elements." And eventually, in late 2022, even isolating the hi-hat from the cymbals, and the ride and crash cymbals from each other, which the system can now do. Absolutely remarkable.

As previously noted, an interesting thing about the vocals is they were recorded live with a Neumann U48 microphone set to its figure-eight pickup pattern. This allowed pickup of front and back-facing sounds, but not sounds hitting the mic from its side. The Beatles would stand on either side of the mic and sing, with the mic placed so that its side faced the instruments in the room, thus reducing the amount of spill from those instruments that made it into the mic while they sang. In later recordings, where the vocals were recorded as overdubs onto other tracks, a large playback speaker rig, affectionately known as the "White Elephant," due to its size and color, was placed on that off-axis, to the singer's right or left.

There was often spill on the vocal track, Sam says. "But Emile was finally able to separate the vocal from the band (or White Elephant) spill. So we had more control over it, which is fantastic."

He adds, "It's amazing, groundbreaking technology. Once you get the parts back, because the separations are so good, you can do almost anything you'd do if they were original multitrack splits. You very quickly stop thinking about the technology, and just go, 'Okay, well, I've got this thing from 1963, and I just happen to have the drums separated into each element, I've got the bass, I've got all the rhythm guitars.' It's brilliant."

Giles and Sam's approach to remixing Beatles has never changed since they began doing it with *Sgt. Pepper's Lonely Hearts Club Band*—provide a fuller, richer mix, but remain respectful of the relationship fans have with the original mixes. "That's really absolutely key," Giles states. "The character and the tone of the song remains." Sam agrees. "It has to be. And we're constantly referencing the original mixes," typically the mono, "and asking ourselves, 'What have we done, and why have we done it? Is it better?' It's all subjective. The mixes are, once again, reviewed by the Apple board. "We've had a few comments, and then subsequent revisions. It's a collaborative process."

"They are indeed respectful," adds Kevin Howlett. "These mixes are listened to carefully by The Beatles themselves, and other people involved in the team."

The mixes follow the same approach the two have taken for the later albums: drums, bass and lead vocals in the center, "Then," says Sam, "we think about how do we make the band work around that?'" with guitars and other instruments spread to the sides, as appropriate. "We try to make it a slightly more modern stereo mix. And this brilliant technology has allowed us to do that with this early material."

Gone are the "ping pong" mixes, as Kevin Howlett calls them, of rhythm track hard left, vocals hard right. "Twist and Shout," with John's raucous vocal, Ringo's drums and Paul's bass now in the center, and the guitars to the sides, still sounds like a 1963 recording, just. . . better.

Kevin notes, "Giles always says, 'I'm not doing this for you or me. It's for a new generation. I'll never make them sound like a new recording—like Drake or Taylor Swift. But I want to make them sound like they're the age they were when they were playing the songs. I want to make them vibrant, I want you to experience them as if you are hearing them playing in the room.' And I think that's what these mixes do."

Drums are in the middle, explains Giles, because "No one wants to hear drums all on one side now. There's a different approach now than there was in the Beatles days. Today, rhythm is everything. And drums coming out of two speakers, instead of just one, you get more power, more punch. There's a huge benefit to hearing Ringo as you hear him now."

Similarly, bass is in the center, instead of forced to one side. “Basses are interesting, because below 300 Hz, we don’t have much spatial recognition anyway, as human beings,” Giles says. “But on a track like ‘Drive My Car,’ the drums are panned slightly, because there’s simply not much on that track—only guitar and bass. A bass panned only to one side just doesn’t cut it.”

At the end of 2022, once the decision had been made to remix the two albums, Giles and Sam worked for almost a year remixing the nearly 50 songs required for both sets. “There was just so much material, doing both the stereo and Dolby Atmos mixes,” Sam says. The two would work both together and separately, in their own studios, getting together at Abbey Road here and there to finalize tracks together. “But we usually laid the groundwork separately.”

The pair utilize something they’ve done for years now—re-amping. Speaker systems are set up in Abbey Road’s Studio Two, where most of The Beatles’ work took place, with a complex microphone rig placed many feet back, to capture the ambience of the room. “It’s quite laborious,” the engineer explains. “It’s a real time process. We play back every single drum split, every rhythm section, all vocals, all separately. We have a whole bunch of different mics, per signal, when we’re re-amping. So we end up with hundreds of tracks of this. And then, in the mix, we can decide what we want to use, what sounds best. It’s helpful in the stereo mixes, but certainly in the Atmos, where you might want to pan an instrument half left, and then pan the ambience of that to the right. It gives a bit more of a stereo width.” It took about six days to capture those countless ambience recordings.

Key Song Notes

Creating a stereo mix for “Love Me Do,” which has never had one, is something fans have hoped for for many years. Now they have one—and it’s quite good. And it is actually the first version of the recording, with Ringo drumming, which was briefly released in 1962. Its replacement, recorded a week later with session drummer Andy White playing drums and Ringo on tambourine—has forever since been the master. “The first version is actually the only Beatles master that was ever destroyed,” notes Kevin Howlett, all later copies of that recording ever issued were drawn from a 45 rpm single. “Now we have the original single version on the *Red* album, which is different from all previous issues of the set—and it’s in stereo, which is incredible.” And with Paul’s vocal now clear and in the center, separated from the other instruments, we get a true sense of his abilities as a blues singer.

The main challenge, when detangling a mono mix, explains Emile de la Rey, is “The more sounds you pile on top of each other, the more potential dynamic interaction and masking there will be, especially when compression is involved.” Snare drum hits can cause the level of the guitars to “duck” down momentarily. “With a multitrack tape, there are less elements interacting with each other, so it’s a bit easier.” “Love Me Do,” thankfully, falls under the “simpler” category.

20

The group’s second single, recorded on Twin-track—and their first No. 1, “Please Please Me”—is one in which Sam was able to take advantage of the full drum separations he had received from Emile. Ringo’s tom tom hits just before John’s “I don’t wanna sound complaining” bridge sections are heard rolling around the kit, as we might hear today—just enough to bring the song to life, but not turn it into something modern.

Songs taken from the group’s first LP, *Please Please Me,* also recorded on Twin-track, reveal elements maybe not noticed in the original ping-pong’d stereo, such as the handclaps now heard throughout “I Saw Her Standing There.”

For “From Me To You,” Sam took advantage of Emile’s skills by pulling John’s harmonica, heard in the intro in the original mono mix, but not in the stereo, and placing it in his new stereo mix. “Emile separated both the mono and the stereo, giving us the harmonica, and then we essentially recreated what they did in mono, but in stereo,” the engineer states.

One thing that often appears in Beatles rhythm tracks is both John and George playing electric guitars which are so similar in tone and power structure that even MAL has difficulty separating them. “That was definitely reaching the limits of what our models could achieve at the time,” Emile explains. “In the Twin-track recording on this song, George’s Gretsch was prominent on Track 1, and John’s Rickenbacker more audible in Track 2. However the level of John’s guitar part was very low, compared to the other elements. So the isolation of John’s guitar part that we were able to deliver to Giles didn’t work well, standing on its own in the mix.” So both guitars are heard together.

21

20) Sam Okell’s re-amping setup in Abbey Road Studio Two. 21) Red and Blue remix engineer Sam Okell

“She Loves You,” the other of the two songs for which only a mono mix exists, proved a bit more difficult for MAL to separate out all of the elements, with so many parts piled on top of each other in a more raucous manner, including the constant swash of Ringo’s hi hat. “It has to do with the way the song is gelled together,” Giles explains. “‘Love Me Do’ is slower, and it’s a less dense arrangement,” adds Sam. “So there’s more chance for the software to get hold of the separate elements. Here, everyone’s thrashing away.”

“That song was challenging, due to the qualities of the mono mix we were working from, especially around the interplay of vocal reverbs, cymbals and other high frequency elements,” Emile explains, “as well as a lot of dynamic masking happening between different elements, once separated. But it actually turned out to be one of the best mono separations the MAL team had done up until that point, considering what we started with.”

The original master always had a noticeable edit between two sections of mix segments, audible at the 1:23 mark, before the “Pride can hurt you, too” line, where the mix suddenly becomes brighter, with louder cymbal crash. But Sam was able to finally smooth that out

Photos courtesy Sam Okell

in his new mix. "I use a program called Cedar Retouch, which we've used a lot before, which has a clever function. You can look at the spectrum of the song's wave, from low to high, with time and frequency, and it can do an interpolation between the two sections," allowing him to unnoticeably adjust to a less bright mix in that second half.

A similar fix was applied to the tail end of "Roll Over Beethoven," for an edit piece George had recorded for his final end chord, which always sounded like something that had been added. "It's much easier to fix those types of things when you have a bit of separation between the instruments," Sam points out.

An interesting thing the separations give him appears in their first U.S. smash hit, "I Want to Hold Your Hand," again allowing him and Giles to handle elements that had been previously all piled together, but in a new way. A mystery instrument had always been heard throughout the song, playing a low-toned "do-do-do-do-do" alongside Paul's bass, within the verses (e.g. after "I. . . tell ya somethin'"). "That's actually a line being played by George on the low notes of his guitar, but not part of his lead guitar part. It's actually on Track 4 of the 4-track tape," on which engineer Norman Smith dropped a number of parts—that guitar line, handclaps, John's double of "And when I touch you I feel happy," and the high "hand!!" background vocals. It is a testament to George Martin, as a producer, to think to add parts such as this for emphasis, in what would be a raucous monophonic mix, and know the effect they would have on that mix.

While occasional session mistakes have an opportunity to be fixed in new mixes, sometimes Giles and Sam opt to leave them in, because they are simply how fans know the song. During the recording of the rhythm track in Paris in January 1964 for "Can't Buy Me Love," George played a lead guitar part which went unused—but the bleed from his guitar amp was picked up by Ringo's drum mics, Sam reveals, something always heard in the background while listening to the guitar solo section, which George later replayed. "Giles and I actually talked about it. That's part of the sound of the song, isn't it." While Emile likely could have removed it, "Taking it out would be wrong, wouldn't it." So it remains, as we've always known it.

Meanwhile, the bit of Ringo shuffling around his kit heard during the opening bass note to "I Feel Fine," clearly in the original stereo mix, is now gone.

While the string quartet for "Yesterday" was recorded together onto a single track, it is now heard in stereo. "The 'Yesterday' string separations were particularly magical!" a happy Emile notes. "At the same time Sam was asking whether a quartet separation might be possible, we had just started experimenting with models that could achieve such separations. It was a moment I'll never forget, panning the quartet across the stereo space for the first time."

The challenge, he notes was the fact that they were recorded using live playback of Paul's vocal and guitar parts, via the handy White Elephant (headphones had not yet come into common use for recording overdubs at Abbey Road). "So we first had to lift away that guide track, and get the quartet sounding well isolated, before being able to even start disentangling the strings themselves," he says. Notes Sam, "The extraction is so good—you can spread them out, as you would, across the image. It's lovely."

Of the *Rubber Soul*-era tracks, "Day Tripper" and "We Can Work It Out" are among Giles and Sam's favorites, no longer suffering from the hard left, hard right panning. And the choice to bring the lead vocals out from hard right to center, with somewhat less reverb than the original mixes, allows one to hear the quality of the Fabs as the great singers that they were. And in the "things we left intact" category, one can still hear one in the group reminding the others, during their background vocal overdub for "Girl," to remember to sing "Tit-tit!"

"A Day In the Life" is presented with a clean opening—no crossfade with audience cheers from "Pepper (Reprise)," as it has always been heard. "That's the mix from the 2017 release," Sam informs. "We had mixed the track then with a clean start, and the applause segue was made during pre-mastering album assembly."

One of the most challenging mixes of the whole set was "I Am the Walrus," particularly for Emile and his team. As many fans know, the second half of the recording features a live radio broadcast of "King Lear," which was added into the mix live, during the creation of the mono mix. With no way to replicate that addition for the stereo mix, Geoff Emerick instead passed the mono mix for that second half of the song through the studio's Automatic Double-Tracking (ADT) system, essentially creating a "fake stereo" mix, for only the second half of the song.

"It was a challenge," says Giles. "It's so mad and screwed up, with the live broadcast and everything that's in there. "I've mixed it before, for the original *LOVE* album," from which he learned not to make the mix sound too hi-fi and clean. "So the whole second half, with the ADT'd mono—how do you replicate that? But I think we got to a good place with it."

The Beatles' 4-track band tracks extend all through the entire length of the song—with, Emile notes, additional radio material on Track 4, towards the end. "The King Lear broadcast is indeed only present on the mono mix and the ADT section" of the subsequent stereo mix. "We demixed the full 4-track tape, including the second half. But, interestingly, it happens to have its own unique set of radio recordings on Track 4, such as additional radio tuning noise and broadcast snippets," different from those which appear in the "King Lear" broadcast material, recorded live into the mono mix.

The MAL team disassembled that additional Track 4 radio material completely, separating the static and tuning noise from the voices and instrumental components, and those now appear separate from the "King Lear" material in the new stereo mix.

In addition, Emile explains, "Sam subsequently asked us to also isolate the radio broadcast voices from the original mono master, the version that everyone is familiar with. So while building the new Atmos mix they would effectively have access to the best of both worlds—the phenomenal sounding 4-track channels, demixed, and the isolated radio voices from the mono mix. And, as you can imagine, those radio voices are quite buried! Our dialogue model is great though. And I also used our dialogue defiltering model, developed during *Get Back*, to restore some clarity to the muffled and deteriorated sounding radio voice isolations."

The elements of the radio broadcast, the Mike Sammes Singers, the band and everything else in there now appear in a true stereo mix, which still retains the unusual character of the original for that portion of the song. And George Martin's unique score in the first section is now broken out between low strings, high strings and horns. But just as Giles had pondered about his mix of the song for *Love*, he and Sam always try to keep objective about their work. Sam notes, "To me, some of these songs, perhaps the poppier ones, are definitely improved in a remix. For me, though, for 'Walrus,' it's different, but is it better? Maybe you hear some things you didn't hear before, but is it a better mix? The jury's out on that."

As Kevin Howlett notes, the new mixes made since 2017 play an important role. "What we're hearing is very revealing to us, and what we're learning is something important—The Beatles were even better than we thought! We always knew they were great. But now we appreciate them more. These albums kept the group at the forefront of music in 1973, three years after they'd split up. Now, they still have the power to bring a new generation into The Beatles' world. For those new listeners, the concept is, ''Here's a selection of material from those two eras, 1962-1966 and 1967-1970, which we think you'll be interested in and will really enjoy. But that's not all. There are all these other great tracks you can go and investigate. This is just your beginning."

+ Now that you made it this far, check out the companion articles "Magic Before and After: Peter Jackson's 'Now and Then' Music Video" and "'Now And Then – The Last Beatles Song' Documentary," also by Matt Hurwitz, on soundandvision.com.

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REFERENCE ★★★★★
EXCELLENT ★★★★½
GOOD ★★★½
FAIR ★★½
POOR ★½
RATINGS

THE CONAN CHRONICLES

ULTRA HD 4K BLU-RAY
STUDIO: Arrow
ASPECT RATIO: 2.35:1
HDR FORMAT: Dolby Vision, HDR10
AUDIO FORMAT: Dolby Atmos with TrueHD 7.1 core

The seminal hero of sword and sorcery, Conan was created by author Robert E. Howard and later evolved from the pages of pulp magazines across movies, TV, and more. His first big-screen outing was also a pivotal career move for bodybuilder Arnold Schwarzenegger, who became a bona fide movie star by anchoring director John Milius' epic adventure film with his statuesque presence: While not everyone can survive the fashion risk of a furry little loincloth, Arnie rocks it. But yes, there are a couple of solid stories to back it all up, reunited in Arrow's magnificent new "Conan Chronicles" boxed set.

Co-written by Oliver Stone, *Conan the Barbarian* explores the theme of suffering, which serves well the big brute's "origin," orphaned and taken from his home to live as a slave, then as a gladiator, later a thief and a mercenary. He and his honorable soldier-of-fortune cohorts are hired to rescue a princess from a mystical cult leader, a journey that will exact a heavy toll before its end. Disc One proffers three largely similar cuts of the film, all potentially feeling a little slow for modern viewers were it not for one of composer Basil Poledouris' best-ever scores, sometimes making even the mundane seem grand.

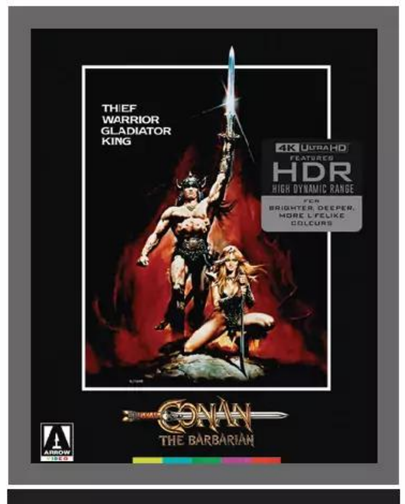
Two years later, with a story by comic book greats Roy Thomas and Gerry Conway, *Conan the Destroyer* was conceived to be a lot more fun, with some seamless additions to the cast—among them dedicated comic relief—and more special effects. Not coincidentally, *Destroyer* is also significantly shorter and carries a PG rating versus *Barbarian*'s R. This time, an even buffer Conan and a mostly new crew are tasked with securing a magical horn that will bring back a god powerful enough to raise the dead, at the behest of a queen who is also a witch: What could possibly go wrong? It's easy to forget that fantasy-adventure was not particularly popular in the early '80s, and these two bold, original entries did wonders to legitimize the genre for generations to follow.

These *Conan*s are born of new 4K/16-bit scans of the original camera negative, restored and presented in their proper 2.35:1 aspect ratio. *Barbarian* immediately displays a healthy grain structure that retains the movie's distinctive 1982-era charm. The many dark scenes have a rich, natural appearance, while the restrained use of color yields standout moments such as striking red blood and orange fire. Contrast is equally strong, as in a raging funeral pyre set against a black night. Switching from director of photography Duke Callaghan to Jack Cardiff, *Destroyer* has an overall softer look with a greater reliance on filters while still preserving ample detail in busy locations and appealing landscapes.

Despite being positioned as would-be summer blockbusters, the theatrical releases of both films went out with mono audio only. That's the default track for all of the options across the set, which is more than adequate thanks to Arrow's new restoration. All elements are sufficiently clear, effects have ample pop, and the music has a welcome prominence in the mix. Although fidelity is challenged on *Barbarian*, it is less problematic in the supplied Atmos reimagining. As expected, the mono is noticeably flatter and less spacious so don't be afraid to give the Atmos a try, although I found it to be somewhat tame, which is ironic for a protagonist who is anything but. And in a further show of love for Mr. Poledouris, his boisterous scores have been newly assembled in their entirety and bestowed in lossless isolated stereo.

Settle in for twin commentaries on *Barbarian* (one archival, one new), four for *Destroyer* (three/one), with lots of fresh interviews and legacy featurettes (*Barb*'s many extras spill onto a second platter). And it wouldn't be an Arrow limited edition without their lavish complement of art cards, posters, and book.

CHRIS CHIARELLA



Conan the Barbarian

1982, R
LENGTH: 127/129/130 mins.
DIRECTOR: John Milius
STARRING: Arnold Schwarzenegger, James Earl Jones, Max von Sydow, Sandahl Bergman, Gerry Lopez, Mako

PICTURE	★★★★
SOUND	★★★½
EXTRAS	★★★★½

Conan the Destroyer

1984, PG
LENGTH: 103 mins.
DIRECTOR: Richard Fleischer
STARRING: Arnold Schwarzenegger, Grace Jones, Olivia d'Abo, Wilt Chamberlain, Tracey Walter, Mako

PICTURE	★★★★½
SOUND	★★★★½
EXTRAS	★★★½

Arrow

THE HUNGER GAMES: THE BALLAD OF SONGBIRDS & SNAKES

ANYONE ASSUMING that this is a prequel to the four-movie *Hunger Games* trilogy—all based on Suzanne Collins' bestselling novels—might find themselves bemused. This time we focus on the winning side in Panem's bloody civil war, with a thoughtful and fascinating character study of the saga's central antagonist, the future president.

After a brief introduction, we jump 10 years into the annual event that pits pairs of children from each of the losing districts against one another in a fight to the death. But the particulars of the competition are still evolving and, in an effort to keep the sport ongoing, eager students like young Coriolanus Snow (Tom Blyth) are each assigned to mentor a sacrificial "tribute" and devise ways to increase viewership.

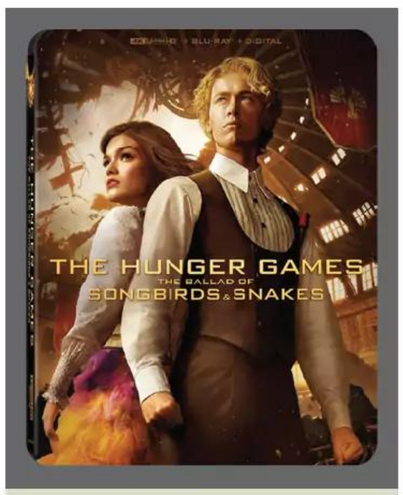
Snow's experiences in the privileged capital are only one part of his journey however, and his ensuing stretch in the districts will prove equally formative. This is a big, unapologetically complex tale that still takes time for world-building in this unique cinematic universe, even though no further installments have yet been announced.

These movies have always displayed an intriguing aesthetic across the costumes, production design and visual effects, captured here in pristine, razor-sharp 4K resolution. The richly nuanced color palette veers into warm gold tones in several scenes, imparting an old-world feel. The arena sequences are where the Dolby Vision HDR shines, as the vast space is brightly lit from a variety of angles yet remains full of intimidating, (usually) organic shadows. Lionsgate has thankfully put this lengthy film onto a BD-100 disc to ensure a high bitrate.

What struck me sonically throughout was the outstanding reproduction of voices, not only Rachel Zegler's mellifluous pipes when she warbles (purportedly recorded live on-set) but the aggressive placement of actors in the different channels in addition to the naturalistic tonal quality and consistent clarity.

There's lots of nifty surround usage, with aggressive hacking, slashing, and other weaponizing, and the overhead speakers get a workout—most notably from the arrival of a massive drone. Without giving too much away, the movie also features one of the most magnificent explosions I have ever heard in my home theater. In short, they put a lot of care into this Dolby Atmos presentation.

The set's extras can all be found on the 4K platter: a director/producer commentary, an eight-part/two-hour-plus documentary, uninterrupted audio for one of Ms. Z's songs—and more; most of it repeated on the supplied HD Blu-ray. A single-vendor digital copy code is included as well. ● **CHRIS CHIARELLA**



ULTRA HD 4K BLU-RAY

STUDIO: Lionsgate, 2023
ASPECT RATIO: 2.39:1
HDR FORMAT: Dolby Vision, HDR10
AUDIO FORMAT: Dolby Atmos with TrueHD 7.1 core
LENGTH: 157 mins. PG-13
DIRECTOR: Francis Lawrence
STARRING: Tom Blyth, Rachel Zegler, Viola Davis, Peter Dinklage, Jason Schwartzman, Josh Andrés Rivera, Hunter Schafer

PICTURE ★★★★½
SOUND ★★★★★
EXTRAS ★★★½

Lionsgate

THE MARVELS

THE MARVELS begins with Carol Danvers, a.k.a. Captain Marvel, journeying to an anomalous wormhole linked to a Kree revolutionary. While investigating the strange phenomenon, her powers become inexplicably entangled with super-fan Kamala Khan, a.k.a. Ms. Marvel, and Carol's estranged niece, astronaut Captain Monica Rambeau. This unlikely trio must team up and work together to save the universe.

As a fan of 2019's *Captain Marvel*, I was certainly eager to revisit this corner of the MCU. Unfortunately, an overabundance of narrative threads, odd tonal shifts and misplaced shtick result in a lackluster entry that many found disappointing. The concept of having the three heroes join forces is fine, but the attempt to give them an equal share of the narrative pie is where things go awry. The lack of a well-drawn villain and a hurried runtime didn't help matters. Hopefully, the next installment—if there is one—gets things back on track.

This film is boldly colorful, relying on stylized visuals that employ stark contrast, varying chromatic elements and lots of CGI. The level of detail and emboldened chromatic highlights underscore the film's thematic impact. High dynamic range plays a central role, via vibrant specular highlights, while mixed light/dark elements reveal appreciable dimension in blacks and shadows, which provide lots of depth. There is some innate softening due to the extensive CGI, but it's rarely depreciating. Across the board, this presentation—with its level of detail, color depth and deep blacks—made for an enriching and engaging visual display.

The Dolby Atmos mix is solid, offering rich sonic clarity and clear dialogue reproduction. The detection of subtle background sounds, off-camera cues and spatial dimension within the acoustic environment is excellent. The sound mix creates true immersion that serves the onscreen action. The music is spread effectively across the soundstage, adding a natural depth to the orchestrated elements of the track. The LFE channel is active, working in tandem with the rest of the system to convey the bass and impact associated with the action-based sequences.

I particularly enjoyed the soundtrack's balance of atmosphere/discrete object placement, each complementing the source material and making for an entertaining listening experience.

Bonus features include two excellent production featurettes which offer insights from the cast/crew, along with deleted scenes, a gag reel and director's audio commentary. A feature film Blu-ray and Movies Anywhere digital code complete the set.

The Marvels looks and sounds great on 4K disc although the movie itself is not akin to the level of superhero entertainment we have come to expect.

● **RALPH POTTS**

ULTRA HD 4K BLU-RAY

STUDIO: Walt Disney, 2023
ASPECT RATIO: 2.39:1
HDR FORMAT: HDR10
AUDIO FORMAT: Dolby Atmos with TrueHD 7.1 core
LENGTH: 105 mins., PG-13
DIRECTOR: Nia DaCosta
STARRING: Brie Larson, Iman Vellani, Teyonah Paris, Samuel L. Jackson, Zawe Ashton, Seo-Joon Park

PICTURE ★★★★★
SOUND ★★★★★
EXTRAS ★★★½

Walt Disney

WONKA

BASED ON the extraordinary, iconic character at the center of Roald Dahl's *Charlie and the Chocolate Factory*, one of the best-selling children's books of all time, *Wonka* tells the wondrous story of how a young chocolate-maker, armed with nothing but a hatful of dreams, manages to change the world, one delectable bite at a time. 1971's *Willy Wonka & the Chocolate Factory* will forever hold a special place among my favorite childhood films. To me, it has an endearing charm and timeless appeal that can be shared from one generation to the next. I never tire of watching it.

However, I am not so certain that we needed an origin story for Willy Wonka, an established and beloved character whose imagination and flair for invention needs no introduction.

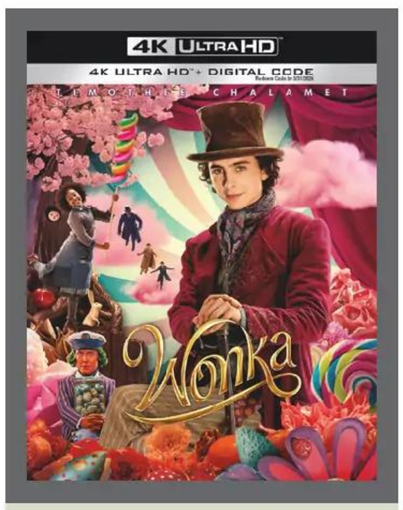
Fortunately, *Wonka*'s heart is in the right place, giving us a sweet, minorly manipulative tale that strikes familiar chords while shedding a bit of light on the childhood events that helped shape Willy into the beloved magician, inventor, and chocolate-maker we know and love. The script plays slightly overlong but manages to keep things on track, adding a few original songs, supporting subplots and a bit of melodrama/comedy that effectively convey the spirit of its subject.

Wonka was derived from 4.5K sources and finished on a 4K digital intermediate. This can be a visually dazzling film that benefits from the enhanced resolution, emboldened contrast, and wide color gamut. Minute details can be seen in wide-angle and close-up perspectives, enhancing depth/dimension. HDR effectively drives the story's use of visual cues, resolving interstitial details that promote depth of field. Black and white levels strike good balance, resulting in images that have ample visual pop.

The Dolby Atmos is generally well-balanced, comprised of a mix of atmospherics and occasional discrete effects. The music is subtly mixed over the platform, adding natural depth to its orchestrated elements without drawing attention away from what's happening on screen. Clarity and dialogue reproduction are excellent. Dynamic range and bass response are appropriate, adding thematic emphasis and resonating punch when called upon to do so. This is a solid audio presentation that mates well with the source material.

Bonus features amount to five production featurettes, which offer insights from the filmmakers on adapting the book, costume design, the music score and the various chocolates featured in the film. A Movies Anywhere digital code is included.

Wonka isn't a wholly gratifying film but has an endearing and familiar charm that is enhanced by its presentation on Ultra HD Blu-ray. ● **RALPH POTTS**



ULTRA HD 4K BLU-RAY

STUDIO: Warner, 2023
ASPECT RATIO: 2.39:1
HDR FORMAT: Dolby Vision, HDR10
AUDIO FORMAT: Dolby Atmos with TrueHD 7.1 core
LENGTH: 116 mins., PG
DIRECTOR: Paul King
STARRING: Timotheé Chalamet, Calah Lane, Keegan-Michael Key, Paterson Joseph, Matt Lucas, Mathew Baynton

PICTURE ★★★★★
SOUND ★★★★
EXTRAS ★★★½

Warner

LITTLE DARLINGS

RETURN WITH us to a halcyon age of cinema when mature subject matter wasn't forbidden, it was simply rated R. So it was with *Little Darlings*, a surprisingly sweet and remarkably honest snapshot of adolescence circa 1980. There's no real violence or profanity, and the teenage coitus at its core is merely alluded to, never shown. See, summer camp brings together youngsters from all walks of life, and one of the more experienced girls strong arms two newbies into a bet: whoever loses her virginity first wins.

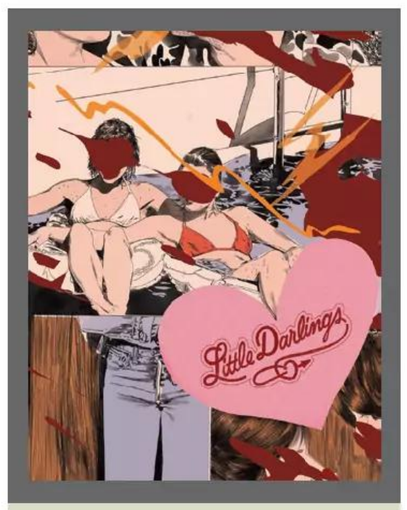
The subsequent talk isn't nearly as trashy as we might expect, instead exploring the loss of innocence in more ways than one. To its credit, the sensitively imparted story sidesteps the pitfalls of similarly themed bawdy comedies or maudlin dramas of the period. Its one shortcoming might be its incongruous juxtaposition of wholesome, G-rated food fights and such with its more serious content—augmented by matter-of-fact underage beer drinking and abundant cigarettes—but taken as a whole it still works.

A hit in theaters and on cable, *Little Darlings* incredibly had no U.S. DVD release that we could find, and no Blu-ray until this Ultra HD combo pack.

The new 4K restoration is all that we could hope for. The widescreen image pulls ample detail from the original camera negative, to the point where we can practically count the blades of grass or star Tatum O'Neal's freckles. A respectable level of grain is retained, while extremely rare, minor imperfections do nothing to spoil the experience. Many shots were initially captured soft, although others reveal excellent depth of field. Colors can lean toward the drab sometimes but are given new life with the disc's re-grading and wide color gamut.

We learn from the extras that director Ron Maxwell is quite proud of *Little Darlings*, right down to its sound mix. The simple lossless two-channel presentation of the original stereo soundtrack works extremely well for the material. Fairly basic sound effects and ambiance are occasionally elevated by the addition of well-chosen pop songs (Supertramp!). This is a dialogue-driven movie, always perfectly clear even with a silent center channel.

Twin commentaries adorn the 4K disc, one from Maxwell and another from podcaster/expert Millie De Chirico, both repeated on the HD Blu-ray, which adds a nigh-hour-long on-camera interview with the director, a well-researched video essay, an audio discussion of the broadcast TV edit, and 6 minutes of deleted scenes. We reviewed the numbered, limited-edition set, its two discs collected inside a clothbound book housed in a darling little slipcase. ● **CHRIS CHIARELLA**



ULTRA HD 4K BLU-RAY

STUDIO: Cinématographe/Vinegar Syndrome, 1980
ASPECT RATIO: 2.35:1
HDR FORMAT: HDR10
AUDIO FORMAT: DTS-HD Master Audio 2.0
LENGTH: 95 mins., R
DIRECTOR: Ronald F. Maxwell
STARRING: Tatum O'Neal, Kristy McNichol, Armand Assante, Matt Dillon, Krista Errickson, Cynthia Nixon

PICTURE ★★★★½
SOUND ★★★★½
EXTRAS ★★★★

Cinématographe/Vinegar Syndrome

OLDBOY

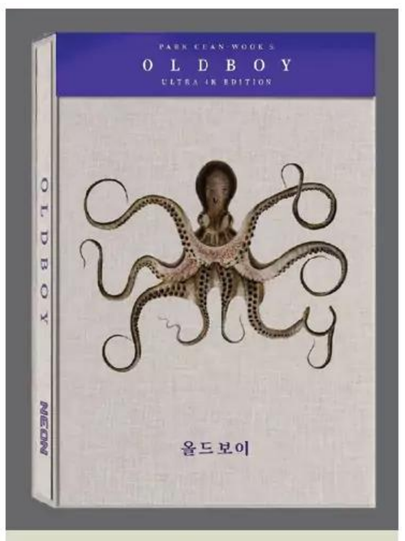
OH DAE-SU is a husband and a father and right now he is a belligerent drunk who is about to wake up in a strange hotel room… or is it some sort of prison? By the time he's released 15 years later, the life he knew is gone, and now he's confronted with a dual mystery: *Why* is he being subjected to this bizarre, extreme form of punishment, and *how* exactly will this revenge ultimately manifest itself? The answers are sad to be sure but the consequences are far darker.

This is *Oldboy*, the most intense, most disturbing thriller you've never seen, where the shocks don't let up and the final twist cuts deep. It's violent to the extent that I still need to turn away once or twice, but surprisingly funny when it wants to be too, a wildly creative manga adaptation of a single-shot hallway fight set piece that could teach Hollywood a thing or two.

Director Park Chan-wook is unafraid to assault his audience, not merely with the subject matter but with his sounds and visions. His stylized use of color (greens especially) and exaggerated contrast, the thoughtful lighting and even the chemical processing of the 35mm film are all exploited to further immerse us in his hallucinatory world. The 4K/Dolby Vision presentation reveals details I missed upon previous viewings, with even Oh Dae-su's black suit showing remarkable nuance. The limited yet ambitious CGI elements are keenly integrated and have made a successful transition to 2160p.

The original Korean verdsion is our only audio option, available in two-channel and 5.1 DTS-HD Master Audio mixes. The surround is a superlative complement, enhancing the mood by conveying the stark action beats through aggressive use of the rear, liberal low frequencies with subtle resonance, and realistic room tone in the quieter moments. A 7.1 mix exists but was not included in this new edition, although Neon/Decal has provided an isolated music and effects track.

All three commentaries feature the director—solo, with his cinematographer—and another with his three lead actors; in Korean, with subtitles. This slipcased set contains several hours of extras on a second disc, almost all of it archival and at varying video quality: interviews, featurettes, production diaries and the like, plus a new sit-down between Park Chan-wook and fellow filmmaker Nicolas Winding Refn. There's also a set of neatly packaged arts cards and a clothbound book that I'd be tempted to call beautiful were it not for the image of the severed hand on the cover. ● **CHRIS CHIARELLA**



ULTRA HD 4K BLU-RAY

STUDIO: Neon/Decal Releasing, 2003
ASPECT RATIO: 2.39:1
HDR FORMAT: Dolby Vision, HDR10
AUDIO FORMAT: DTS-HD Master Audio 5.1 (Korean)
LENGTH: 120 mins., R
DIRECTOR: Park Chan-wook
STARRING: Choi Min-sik, Kang Hye-jeong, Yoo Ji-tae, Jin-seo Yoon, Dal-su Oh, Kim Byeong-Ok

PICTURE ★★★★★
SOUND ★★★★★
EXTRAS ★★★★

Neon/Decal Releasing

TRAINSPOTTING

HANG ON for a wild ride through '90s Scotland as *Trainspotting* returns, nastier than ever. Adapted from the book by Irvine Welsh, it traces the ups and downs of a group of working-class young friends, most of whom are habitual intravenous drug users. The movie gets right to the heroin and not in the way audiences of the era likely expected, proclaiming narrator Mark Renton's (Ewan McGregor) love for the stuff even as it sends his life out of control.

Instead of lapsing into the heavy-handed clichés of a cautionary tale, it's actually incredibly funny, in a very R-rated way that can also be rather unsettling. In other words, there's never been a movie that's balanced boundary-pushing comedy and drama like this, before or since, and it remains required viewing.

Criterion has been crushing it lately. They want us to know that this is the uncut version of the film, as many alterations have been made over the years, and this superb new video master has been supervised by director Danny Boyle from a 4K scan of the original negative. What might have once been dismissed as low-budget and kind of ugly and/or dated is now revealed to be wonderfully textured. There is a wealth of immersive detail evident in the production design, right down to the abundant stains, yielding a perfect snapshot of a specific time and place. "The worst toilet in Scotland" is fully wretch-inducing, while life in and around frequently overcast Edinburgh is enlivened by bittersweet splashes of color.

The disc defaults to a discrete 5.1 soundtrack, although the vintage 2.0 surround track is supplied as well, both in DTS-HD Master Audio. The little touches are terrific, like the lone fly buzzing about behind and to the left in the aforementioned loo, or the echo retained in the on-location dialogue… even if I still can't understand a lot of what these blokes are saying. I was dismayed that the surround channels were not active for the crowd at the pub, however, the whole room thankfully comes alive when we visit the dance club. The many musical selections are vital to the experience—I bought the CD, way back when—and the mix is spot-on, with ample bass oomph.

The complement of solid legacy extras dates all the way to 1996, among them a multi-participant commentary on the 4K disc and 10 minutes of deleted scenes on the HD Blu-ray, now joined by a new featurette about the costumes and art direction. The platters arrive in a curious, all-cardboard case with glow-in-the-dark accents. ● **CHRIS CHIARELLA**

ULTRA HD 4K BLU-RAY

STUDIO: Criterion Collection, 1996
ASPECT RATIO: 1.85:1
HDR FORMAT: Dolby Vision, HDR10
AUDIO FORMAT: DTS-HD Master Audio 5.1
LENGTH: 94 mins., PG
DIRECTOR: Danny Boyle
STARRING: Ewan McGregor, Ewen Bremner, Jonny Lee Miller, Kevin McKidd, Robert Carlyle, Kelly Macdonald

PICTURE ★★★★★
SOUND ★★★★
EXTRAS ★★★½

Criterion

FOOTLOOSE

UPON ITS release 40 years ago, *Footloose* thrilled audiences with its spirited dancing, electrifying soundtrack and inspiring story about a Chicago city-boy, Ren McCormick, who arrives in an uptight small town where dancing has been banned due to its potentially sexual influence on the minds of its teenaged residents. Ren quickly falls for the minister's daughter, but his love for music and dancing gets him into hot water equally fast, not only with the town leaders but a local hard case with a score to settle.

Being roughly the same age as the actors in the film, I was at a similar stage in my life when *Footloose* came to theaters. I understood its interpretation of young people trying to find their way in the world while dealing with the complexities of restrictions placed upon them by overbearing adults who seem to have forgotten what it was like to be young.

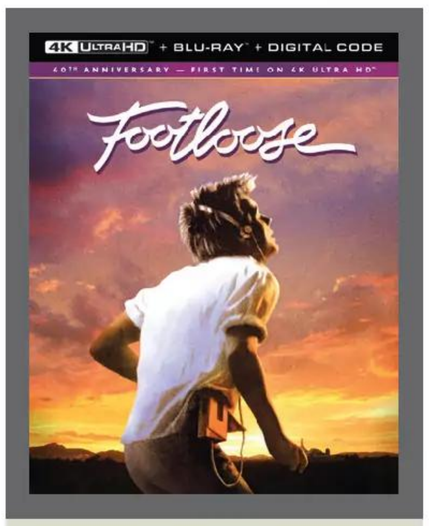
Watching it today still feels very much as it did the first time I saw it. The script neatly summarizes its characters strengths and weaknesses before leading us to a coming-of-age epilogue that culminates in shared understanding and an enjoyable dance-off that is ultimately gratifying.

The 4K video is a mixed bag that leaves some sequences appearing less visually engaging than others. Upon viewing the opening scenes, the first thing that struck me was that there wasn't an appreciable uptick in sharpness or resolution when compared to the included HD Blu-ray. Upon closer inspection, I could make out finer details in facial features, clothing and objects within the frame, with occasional improvements in depth during wide-angle shots. In general, the image didn't make compelling use of interstitial black levels offset by vivid bright elements, although there is little call for this. The result is an unremarkable Ultra HD presentation that falls short of the best we have seen from the format.

The soundtrack won't knock your socks off, but delivers clear dialogue, effective use of the surround channels for ambient support of the music and low-level bass presence that helps underscore effects. There are a few audibly engaging moments associated with the musical performances that aided in providing that nostalgic feeling.

Bonus material includes two audio commentaries, interviews with Kevin Bacon and Sarah Jessica Parker, screen test footage, production featurettes and theatrical trailer. The Blu-ray and digital code finalize the package. A steelbook edition is also available.

Footloose helped define the generation of its era. Unfortunately, its lackluster Ultra HD Blu-ray presentation fails to leave an impression. ● **RALPH POTTS**



ULTRA HD 4K BLU-RAY

STUDIO: Paramount, 1984
ASPECT RATIO: 1.85:1
HDR FORMAT: Dolby Vision, HDR10
AUDIO FORMAT: DTS-HD Master Audio 5.1
LENGTH: 107 mins., PG
DIRECTOR: Herbert Ross
STARRING: Kevin Bacon, Lori Singer, John Lithgow, Dianne Wiest, Chris Penn, Sarah Jessica Parker

PICTURE	★★★
SOUND	★★★½
EXTRAS	★★★★

Paramount

JUSTICE LEAGUE: CRISIS ON INFINITE EARTHS–PART ONE

BY 1985, DC Comics was juggling a vast stable of characters with too many variations across an unwieldy menagerie of alternate planes of existence. How to simplify matters and also make an honest buck? The answer arrived in the form of *Crisis on Infinite Earths*, a popular and influential crossover comic book maxi-series by Marv Wolfman and George Pérez that effectively reset the lineup for a new generation of fans.

Warner's long-running slew of excellent direct-to-video animated movies has finally gotten around to adapting this particular storyline, understandably making some changes while retaining the gist: An unknown and incredibly powerful being has dispatched an antimatter wave capable of erasing entire realities, and none of the Earths heroes, villains, or any version of them is safe. The themes and plot points of this new iteration of the tale have been quietly building over the last 10 animated movies, similar to how Marvel patiently led us to the big doom of *Infinity War*.

Indeed, the stakes are high in *Crisis*, with some major names giving their lives in the fight, and the studio has announced that it'll take a trilogy to spin this yarn properly, so settle in. *Part One* puts a heavy emphasis on Flash/Barry Allen, eloquently voiced by Matt Bomer atop an outstanding cast, which (ironically) slows the pacing somewhat The sci-fi stuff can be a little hard to follow, but the cliffhanger ending undoubtedly whets our appetite for what's to follow.

The familiar visual style is somewhat simple but very appealing for its vibrant colors. The screen-filling image is sharp, with clear graphical readouts and stable geometry in the destructive antimatter. The high dynamic range invigorates the appearance of brilliant, glowing energy and renders the spacey blacks nigh-infinite. Whereas I compared the 4K and HD discs of *Batman: The Long Halloween* to confirm my findings in that review, I can't do that here because only an Ultra HD disc and a Movies Anywhere digital copy of *Crisis* are provided.

The DTS-HD Master Audio is likewise robust, evident in the wave of death as it moves menacingly around the room. The explosions and the different battles are plenty powerful, and we're treated to a generous helping of discrete surrounds in addition to some dramatic phasing, as when a car screeches past and into a crash.

This 4K edition is available exclusively in a steelbook case adorned with a sampling of the do-gooders and rogues. Extras consist entirely of two brief featurettes discussing the significance of *Crisis* and its fleet-footed champion and both of them are definitely worth a watch. ● **CHRIS CHIARELLA**

ULTRA HD 4K BLU-RAY

STUDIO: Warner, 2024
ASPECT RATIO: 1.78:1
HDR FORMAT: HDR10
AUDIO FORMAT: DTS-HD Master Audio 5.1
LENGTH: 93 mins., PG-13
DIRECTOR: Jeff Wamester
STARRING: Matt Bomer, Jensen Ackles, Darren Criss, Meg Donnelly, Stana Katic, Jimmi Simpson

PICTURE	★★★★½
SOUND	★★★★½
EXTRAS	★★

Warner

YES: THE YES ALBUM

SUPER DELUXE EDITION BOX SET

4CD/1LP/1BD

Label: Atlantic/Rhino

Audio Formats: 16-bit/44.1kHz LPCM stereo (CD); 24-bit/48kHz Dolby Atmos, 24-bit/96kHz DTS-HD Master 5.1, 24-bit/96kHz LPCM stereo (BD)

Number of Tracks: 48 (36 on 4CDs; 6 on 1LP, 6 on 1BD)

Length: 5:42:46 (4:19:12 on 4CDs; 41:47 on 1LP, 41:47 on 1BD)

Producers: Jason Jones, Steve Woolard (super deluxe edition); Yes, Eddie Offord (original album)

Engineers: Eddie Offord (original album, singles, and rarities); Sean Magee (super deluxe edition mastering); Steven Wilson (2014 remixes and instrumentals; 2023 Atmos and 5.1 mixes)

Performances ★★★★★

Sound ★★★★½

Because of his close association with Yes' signature sound, guitarist Steve Howe is assumed to have been a member of the British progressive giants from the outset—but he only came aboard with the five-man band's third studio release, February 1971's *The Yes Album*. Though his fretboard predecessor, Peter Banks (who later co-founded the prog-adjacent '70s outfit Flash), foreshadowed the aural adventurism to come on July 1969's *Yes* and July 1970's *Time and a Word*, it was *The Yes Album* that cemented the wide-ranging, time-signature-challenging sonic template for one of *the* most forward-thinking progressive acts of the past six decades.

Perhaps somewhat lost amidst the end-of-year box set shuffle, Atlantic/Rhino's 4CD/1LP/1BD super deluxe edition of *The Yes Album* is a welcome addition to a

canon that has seen a myriad of reissues and remasters over the years. If this expanded collection is any indication, future Yes boxes will be quite formidable entries in their perpetually bulging catalog.

Here's what *The Yes Album* box set entails. The LP and CD1 both house the 2023 stereo remaster of the original 1971 album. CD2 holds five of Steven Wilson's prior 2014 remixes for the album, along with instrumental versions of those five vocal-led tracks. CD3 contains 13 rarities (singles and mono versions, plus alternate and extended takes). CD4 hosts seven live selections culled from two of-era concerts—three tracks (one unreleased) from Konserthuset in Gothenburg, Sweden on January 21, 1971 (a few weeks before *The Yes Album* came out) and four previously unreleased tracks from the Yale Bowl in New Haven, Connecticut on July 24, 1971 (during the ensuing U.S. tour). Lastly, the Blu-ray offers two Wilson-mixed versions of the core album in Dolby Atmos and DTS-HD Master 5.1, plus the 2023 stereo remaster. The box set's hardcover sleeve measures in at LP size—12¾ x 0½ x 12¾ inches (w/h/d)—and it will fit quite nicely on your album-centric shelves. The inner-left pocket holds the LP and 12-page booklet perhaps a bit *too* snugly—a recurring nit I have with Rhino's similarly packaged archival collections for artists like The Doors and Prince, so tread lightly upon your top-slot removal process. The BD is nestled in the middle of the left side of the gate, residing in its own negative-image sleeve held in place by two miniscule diagonal corner slits, while all four non-sleeved CDs are in plain view in two symmetrical rows on the right side, each held in place by super-snug raised plastic centers.

Naturally, our man Steven Wilson's Atmos mix is the linchpin here—an update of the 24-bit/96kHz DTS-HD Master Audio 5.1 mix he did for the 2014 Panegyric Blu-ray then dubbed as the "definitive" edition. But as Wilson observes in the box set's liners, he took "quite a different approach on some parts of the music, partly by virtue of now having the extra speakers to place the sounds in, but also because I've learned a few things in the nearly ten years since I first remixed the album."

Here's why we reap the benefits of SW's all-new mixing decisions. Right out of the Atmos delirium gates, "Yours Is No Disgrace" utilizes the height channels as full participants and not supporting acts—the latter being an all-too-common Atmos miscue Wilson always avoids—with the full breadth of guitar, keyboard, and vocal elements on display. Howe's playful twang-wah guitar stabs circa the 5- and 8-minute marks traverse the quadrants like a hard-hit rubber ball on the loose in a squash court. In "Starship Trooper," the final "Wurm" section is a masterclass in slow-rolling tension buildup and volume-impact release, as Howe's guitar solos counter each other back and forth between the center channel and the heights, with Chris Squire's churning bass lines and Tony Kaye's organ fills bobbing and weaving above and around the fray. Not to be outdone, lead vocalist Jon Anderson soars (quite literally) in and above the resplendently repeating harmonies of both halves of "I've Seen All Good People." Finally, "Perpetual Change" closes the proceedings with rear-height keyboard and background-vocal workouts, plus we get a brief clockwise instrumental excursion through each channel.

I hate to view the LP and CD1 as afterthoughts, but that's what I'm doing since they're not the box's focal points. Among my favorite cuts on the other CDs are the still-developing, wordless alternate take on "Starship Trooper" on CD3; the extended, jazz-rock live versions of "Astral Traveller" and "Everydays" from Sweden on CD4; and the "Clap/Classical Gas" instrumental mashup from Connecticut on CD4.

The Yes Album super deluxe edition is hereby officially crowned the definitive version of the band's flag-planting statement release. Hopefully, it's also a precursor to how Rhino will honor the next few roundabouts in the Yes canon, which will likely include November 1971's *Fragile* and September 1972's *Close to the Edge*. Until then, there's absolutely no disgrace whatsoever in immersing yourself in everything *The Yes Album* is in all its sweet accustomed ways, as it goes sailing on by in every possible channel.

● **MIKE METTLER**

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24, and There's So Much More

NEIL YOUNG: *HARVEST*

WHEN I spoke with Neil Young back in April 2014 about his ongoing search for how to share his music in the best resolution possible (Pono, we hardly knew ye), he was laser-focused on what he wanted his audience to experience. "Back when I started recording, we did everything we could so that our listeners could hear the music," he told me. "The more we presented and the more you were able to hear, the happier you were." And that brings us to one of the best examples of that superb-sounding emotional uplift impetus—February 1972's *Harvest*, Young's fourth and most successful solo album. On it, Young, his then-new backing band The Stray Gators, and a selection of A-list guests collectively capture the rustic charm of the Canadian-born artist's roots as blended with the equilibrium-seeking spirit of the times.

Naturally, I love the literal feel and texture of my original, and now quite well-worn, 1972 Reprise LP—one of a few records that, by definition, *must* look and feel "vintage" in perpetuity. Dropping the needle on the Side 1 opener, "Out on the Weekend"—with Young's expressive harmonica blasts and alternating gentle/forceful acoustic guitar strums coupled with Ben Keith's wily pedal-steel lines—immediately set the timeless tone of the bountiful *Harvest* table. Oh, and those *harmonies*—especially the blends Young, James Taylor, and Linda Ronstadt get on "Old Man" and "Heart of Gold." Every time I hear Ronstadt take it higher and higher on her final, multi-syllabic pass on the word "go-ohhh-old," I get the chills.

For her part, while we were discussing *Harvest* in early 2014, Ronstadt clarified how it all went down at Quadrafonic Sound Studios in Nashville in February 1971. "It was just a long, long, long, *long* night, but it didn't matter how tired you got—there was no discomfort, even though I was exhausted," she recalled. "My voice was just ragged—just shredded—but I didn't care. It was pure joy to do it. We were young and we were in the groove, so we kept on playing." Ronstadt added that the banjo on "Old Man" was the result of pure James Taylor inspiration improvisation. "James had come into the studio and there was this banjo with six strings on it, tuned like a guitar," she noted. "He picked it up and started fooling around with it, and I really liked the sound it settled into."

I eventually bought the 1985 Reprise Redbook CD, 2004 Reprise reissue CD, and 2009 Reprise remastered HDCD for my usual archival purposes, but vinyl remained the best way to experience *Harvest*—at least until the 2002 Reprise DVD-A came along. The DVD-A offered heavenly 24-bit/96kHz Dolby Digital 5.1 and 24/96 DTS-HD Master Audio 5.1 options, in addition to a 24/192 stereo version—but now, we have the new, digital-only 2023 Atmos mix overseen by Young and Niko Bolas that takes it all to the next level. In Atmos, you hear the full character of drummer Kenny Buttrey's snare on the title track and most especially on "Heart of Gold," something that really only truly emerged on the earlier 5.1 versions. And, as dramatic as "A Man Needs a Maid" is in stereo in the middle of Side 1 on the LP, it soars even higher in Atmos, with the London Symphony Orchestra's chimes, flute, and string section details floating above Neil's stark piano playing and vocal field. The LSO's final, into-the-red volume swell that comes just ahead of the song's denouement adds the weighty emotional gut-punch the stereo version delivered as best it could until the surround mixes came along. I could even say "ditto" for the Atmospheric interplay between Neil and the LSO on "There's a World" (and, well, I just did).

When the 50th anniversary of *Harvest* cropped up in 2022, Neil and Reprise delivered *Harvest* anew physically, serving up a pair of ample box sets—a 3CD/2DVD cube and a full-size 2LP+7-inch 45/2DVD edition. I own both for completist purposes, but I've only spent recurring time with the LP box. There, you get the full stereo bloom of *Harvest* on the 180-gram LP1, Young's February 23, 1971 *BBC in Concert* performance on both LP2 and DVD2, the two-hour 1971 *Harvest Time* documentary on DVD1, and a trio of outtakes on the 45. Ben Keith's dobro on the "Journey Through the Past" outtake (Side A, Track 2) is simply sublime.

Harvest shows a younger Neil Young in his prime as an ever-questioning artist literally wise beyond his years. "Music wants to be heard, and it also needs to be felt," Neil said to me a decade ago—and that core tenet still holds true today. Best in Atmos—but also worthwhile in just about any format you choose to consume it—*Harvest* continues to cultivate all the right *feels* between the lines of age. ● **MIKE METTLER**

▲ 1972 Reprise LP

▲ 1972 Reprise LP / right-gatefold Neil Young in the field photo

▲ 2002 Reprise DVD-Audio

▲ 2022 Reprise 2LP/7-inch 45/2DVD box set

▲ 2022 Reprise 3CD/2DVD box set back cover

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